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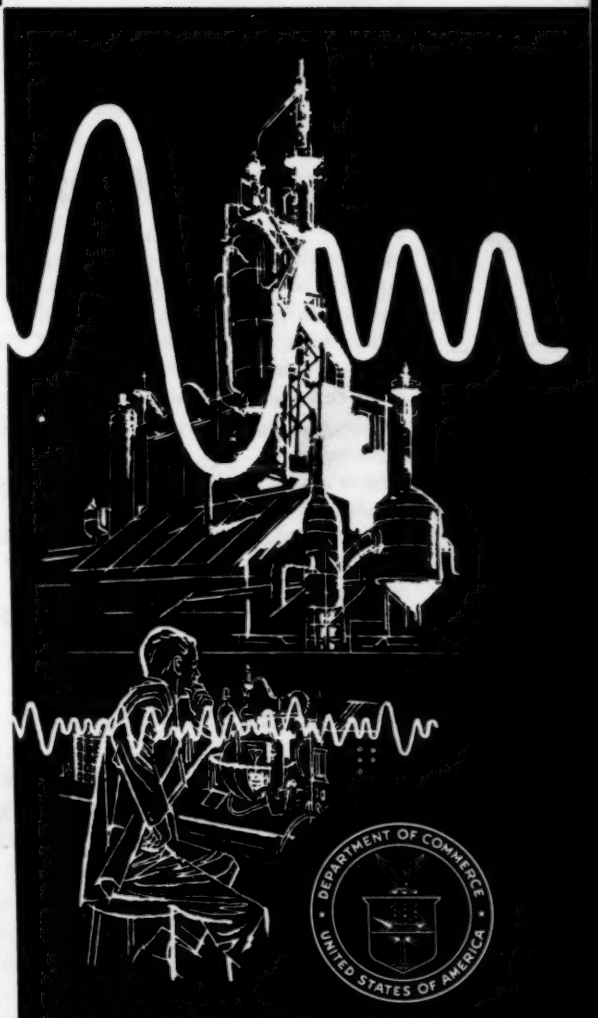

U. S. DEPARTMENT OF COMMERCE

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U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, Secretary

OFFICE OF TECHNICAL SERVICES
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AD-417 408 DIV. 26

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AD-417 175 DIV. 13

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TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-417 126 Div. 1, 10, 12
(TISTM/BRW) OTS price $1.50

Bureau of Mines, Washington, D. C.
REVIEW OF FIRE AND EXPLOSION HAZARDS OF FLIGHT VEHICLE COMBUSTIBLES, SUPPLEMENT 2,
by Henry E. Perlee, Israel Liebman and Michael G. Zabetakis. Apr 63, 49p.
Proj. 6075, Task 607504
ASD TR61 278, suppl. 2 Unclassified report

Report on Flight Vehicle Hazard Protection.

Descriptors: (*Aerospace craft, Hazards), (*Explosive gases, Aircraft fires), Combustion, Fires, Air, Hydrogen, Hydrocarbons, Mixtures, Flames, Flammability, Flame propagation, Vapors, Ignition.

This is the third in a series of reports on the fire and explosion hazards associated with combustibles and other gases likely to be found in aircraft and missile systems. It presents theoretical and experimental results on homogeneous mixtures in air. Two pressure peaks were observed in venting hydrogen-air mixtures into a low pressure atmosphere. When venting a fire above a liquid pool under the same conditions, the liquid regression rate and flame size were found to increase. (Author)

AD-417 164 Div. 1, 25
(TISTP/JP) OTS price $2.60

Columbia U., New York.
AN INVESTIGATION OF HIGH-ALTITUDE BALLOONS OF SHAPES WHICH ARE NOT ROTATIONALLY SYMMETRIC.
Final rept.,
by H. H. Bleich. May 63, 21p. Rept. no. 1
Contract Nonr26687, Proj. 211 067
Unclassified report

Descriptors: (*Balloons, Aerodynamic configurations), (*Aerodynamic configurations, Determination), (*Asymmetric bodies, Mathematical analysis), High altitude, Balloon equipment, Textiles, Stresses.

An attempt was made to explain the occurrences of nonsymmetrical balloon shapes, using the assumption that the balloon material is in a uniaxial state of stress in the direction of the meridians. This attempt was unsuccessful. It was found that this assumption does not permit the existence of non-symmetric balloon shapes. There is no question that non-symmetrical shapes occur at inflation, but the occurrence at partial inflation is uncertain. In any case, hoop and shear stresses occur at launching, and under wind load, such that it seems logical, to provide for hoop and shear stresses in the future development of reinforced Mylar or other new fabrics. (Author)

AD-417 209 Div. 1
(TISTB/AAR) OTS price $10.50

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
SYSTEMS RELIABILITY ENGINEERING IN CRASH PROGRAMS: THE QUICK REACTION CAPABILITY,
by James L. Maybell. Aug 63, 119p.
Unclassified report

Master's thesis.

Descriptors: (*Aviation accidents, Reliability), Effectiveness, Operations, Analysis, Data, Statistical analysis, Distribution.

The purpose of this report is to evaluate the feasibility and advisability of considering reliability in the United States Air Force QRC programs as related to crash programs in general. These programs are typically constrained by compressed time schedules and small production quantities. Operational reliability and systems effectiveness are calculated from actual failure rate data taken from existing USAF systems that include QRC equipments. A cost model is constructed and used to determine an optimum reliability based on total annual operating costs. Engineering disciplines and estimating techniques applicable to these programs are selected. Illustrative examples are included where data availability permits. Reliability calculations show that on the average QRC equipment is 78% as reliable as other equipment in the same system. QRC equipment degrades system effectiveness by 23% on the average. The sample size of the failure rate data is relatively small; therefore, the confidence level is relatively low. The need and justification for reliability in the QRC program are established. Key questions asked by the QRC engineer on reliability application are individually answered. (Author)

AD-417 246 Div. 1
(TISTP/FR) OTS price $13.00

Lockheed Aircraft Corp., Burbank, Calif.
INVESTIGATION OF MECHANISMS OF POTENTIAL AIRCRAFT FUEL TANK VENT FIRES AND EXPLOSIONS CAUSED BY ATMOSPHERIC ELECTRICITY.
Final rept.
31 May 63, 173p.
Contract NASr59
Unclassified report

Descriptors: (*Aviation fuels, Atmospheric electricity), (*Tank vents, Atmospheric electricity), Ignition, Atmospheric electricity, Air, Lightning, Shock waves, Tests, Fires, Explosions.

A study was conducted to determine the important mechanisms involved in the ignition of fuel vapors issuing from a fuel tank vent under conditions of atmospheric electrical activity. The study included a literature review and experimental and analytical investigation of (a) the mixing of the fuel vent effluent with ambient air for three vent configurations at simulated flight conditions, (b) the electrical environment in the vicinity of an aircraft during lightning activity, including measurements of the far field pressures associated with a high energy discharge, (c) a study of ignition and flame propagation through channels smaller than the normal quenching distance using high

energy spark sources, and (d) a study of simulated lightning discharges as to their capability of producing flames capable of propagating through a typical fuel vent with and without a flame arrester. (Author)

AD-417 257 Div. 1
(TISTA/FRL) OTS price $9.60

Federal Aviation Agency, Atlantic City, N. J.
EVALUATION OF THE WAKE OF AN S-58 HELICOPTER.
Final rept.,
by Robert H. Ahlers and William A. Hiering.
July 63, 1v.
Proj. no. 348 011 01V
Unclassified report

Original contains color plates: All DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Helicopters, Wake), Wind, Velocity, Instrumentation, Hovering, Helicopters, Performance (Engineering), Flight testing, Flight paths, Tests, Anemometers, Color photography.

A brief exploratory study of air movements near the ground within the wake generated by a 12,000-pound Sikorsky S-58 helicopter was conducted under conditions of light and moderate winds. Windspeed instrumentation was used to measure wake speeds in a plane approximately perpendicular to the test site surface wind. The smoke patterns induced by the wake were photographed in color and were used as the basis for correlation of wake speed data. The highest wake velocities occurred during hovering flight. The wake generated by the hovering helicopter contacted the ground quickly, expanded outward from the hover center upon ground contact and exhibited rapid growth - hence rapid wake speed deterioration - and the spreading portions were contained within 20 feet of the ground. Although the wake speeds produced during forward flight were not as high as those produced in hover flight, they persisted in the air mass for a much greater time. Also, the speed of travel of the wake system toward the ground decreases as the helicopter forward speed increases. These wakes with their vortices drifted downwind approximately at wind speed. The maximum propagation of wake velocities upwind was approximately 85 feet. (Author)

AD-417 331 Div. 1, 13
(TISTE/JWS) OTS price $1.60

Aeronautical Electronic and Electrical Lab., Naval Air Development Center, Johnsville, Pa.
DEVELOPMENT OF COOLING SPECIFICATIONS FOR AIRBORNE ELECTRONIC EQUIPMENTS.
Progress rept.,
by A. Saltzman. 2 Feb 60, 12p.
TED Proj. ADC AV44016
NADC EL59113 Unclassified report

Descriptors: (*Cooling and ventilating equipment, Electronic equipment). (*Electronic equipment, Cooling and ventilating equipment). (*Aircraft equipment, Cooling and ventilating equipment). Air cooled, Specifications, Design, Cooling.

Concepts, procedures, and technical requirements to insure that cooling systems developed into electronic equipment for high speed aircraft systems will provide optimum effectiveness are described. These could be used as a basis of specification development. (Author)

AD-417 439 Div. 1
(TISTA/LSK) OTS price $2.60

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
MODIFICATIONS TO ASD WEIGHTLESS AIRCRAFT, C-131B SERIAL NUMBER 53-7806,
by Charles W. Sears and Estell P. Bunch. July 63, 19p.
AMRL Memo. no. P41 Unclassified report

Descriptors: (*Transport planes, Modification kits), Maintenance, Aircraft equipment, Weightlessness.

The Aeronautical Systems Divison has the capability of providing zero and partial G conditions for periods up to approximately 25 seconds. Due to the type of maneuver flown on these aircraft, the C-131B is limited to a maximum of 7000 maneuvers and then retired; hence the original C-131B serial number 53-7823 was replaced with another C-131B, serial number 53-7806. This memorandum outlines the modifications that were accomplished on the replacement aircraft and describes equipment and resources available to the potential user. (Author)

AD-417 446 Div. 1, 33, 7, 19
(TISTA/VGW) OTS price $1.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
AN ANALYSIS OF REQUIREMENTS FOR DISPLACED THRESHOLD RUNWAY LIGHTING.
Interim memorandum rept.,
by Eugene E. Pazera. May 63, 12p.
Proj. 421 9R
Unclassified report

Descriptors: (*Runways, Approach lights), (*Airports, Glide-path systems), Aviation safety, Night landings, Human engineering, Civil aviation, Landing aids.

Human factors aspects of the problem of lighting a runway threshold that has been displaced from the end of the pavement to insure approach clearance of obstacles are summarized. The relation between the runway dimensions and the approach lighting system, particularly concerning potential dangers of causing low approaches, are also considered. If colored edge lights are used in the runway extension that comes before the displaced threshold on the landing path, there is a possibility that an approach guidance conflict will arise. Rather than such color coding of the extension, it is recommended that shielded edge light fixtures be employed. A simulation program is recommended: (1) to determine the probability of occurrence and the magnitude of any adverse effect of the guidance conflict; (2) to establish the acceptable tolerance in spacing between a runway threshold and the approach lighting system; and (3) to verify the requirement for the red terminating bar in the approach light system. (Author)

AD-417 669 Div. 1, 6, 33
(TISTA/VGW) OTS price $5.60

Applied Psychology Corp., Arlington, Va.
PILOT JUDGMENTS OF AIRCRAFT RANGE AND RELATIVE ALTITUDE: GROUND-TO-AIR AND AIR-TO-AIR OBSERVATIONS.
June 62, 1v. Technical rept. nos. 10 and 11
Contract FAA/BRD127
Unclassified report

Descriptors: (*Pilots, Visual signals), (*Flight paths, Visual inspection), (*Aircraft, Navigation), Aviation safety, Height finding, Space perception, Air-to-air, Surface-to-air, Effectiveness, Tests, Evasion, Training, Night flight, Applied psychology, Determination.

Two studies were conducted to approximate the accuracy with which pilots can estimate range and relative altitude of aircraft. Six observers made nearly 5800 groung-to-air estimates, and three observers made nearly 500 air-to-air estimates. Two sizes of target aircraft were used, and flight patterns were arranged to allow examination of the effects of range and altitude estimates of such variables as true range, true altitude, aircraft size, and training in estimating. Training in this study was by the method of Knowledge of Results. Data indicate that there is some tendency to estimate ''close'' aircraft as being farther away than they actually are and distant aircraft as being closer than they actually are. Training in estimating range tends to shift the errors from overestimates to underestimates,or from ''unsafe'' toward ''safe'' judgments. Night relative-altitude estimates of aircraft within 5 degrees above the observer's altitude were more difficult than those at other viewing angles. (Author)

AD-417 714 Div. 1
(TISTA/FRL) OTS price $1.10

Beech Aircraft Corp., Wichita, Kans.
PROTOTYPE DEVELOPMENT -- MODEL 385 AIR REFUELING STORE.
Interim rept. no. 38, 1 July-20 Aug 63,
by C. V. Lassmann. 29 Aug 63, 7p. Rept. no. 4821
Contract NOw60 0060
Unclassified report

Descriptors: (*Refueling in flight, External stores), Flight testing, Jet fighters.

Additional flight testing of the prototype Model 385 Air Refueling Store was started at Patuxent on August 14, 1963. A total of 19 extend/retract cycles were performed during four flights. Chase pilots reported favorably on formating position and drogue characteristics, however, no engagements or fuel transfers were attempted. During the fourth flight, the boom lift cable was broken by an ungoverned extension, resulting in subsequent jettison of the store. Preparations are in process to continue evaluation of the store fuel system by ground refueling test at Patuxent. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-417 113 Div. 2
(TISTP/FR) OTS price $8.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THE CHEMICAL KINETICS OF ATMOSPHERIC DEIONIZATION,
by M. H. Bortner. Mar 63, 88p. Scientific rept. 2
Contract AF19 604 8820, Proj. 8653, Task 865302
AFCRL 63 848 Unclassified report

Descriptors: (*Atmosphere, Ionization), Ionization, Dissociation, Recombination reactions, Ions, Electrons.

The chemical kinetics of the atmosphere determines its composition and changes therein. This is true in the case of an abnormally highly ionized atmosphere such as that existing after a nuclear burst. This study is directed toward the understanding of the chemical kinetics of such an atmosphere. The reaction mechanisms and rates have therefore been studied in detail. The effect of various combinations of reactions on composition has been considered and is discussed. The rates of the individual reactions and the available data on these rate constants have been investigated. Considering the large uncertainties in the values of many of the rate constants and the importance of each of the individual reactions, suggestions are made of reactions which are most in need of further investigation. A summary of recommended values for the rate constants is given. (Author)

AD-417 200 Div. 2
(TISTP/FEM) OTS price $19.75

Air Force Cambridge Research Labs., Bedford, Mass.
PROCEEDINGS OF THE SYMPOSIUM ON THE ASTRONOMY AND PHYSICS OF METEORS HELD AT SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASSACHUSETTS, 28 AUGUST-1 SEPTEMBER 1961.
May 62, 314p.
AFCRL 62 497; GRP 75 Unclassified report

Descriptors: (*Symposia, Meteors), (*Meteors, Astronomy), Physics, Radar, Ionization, Radar echo areas, Electromagnetic wave reflections, Radio signals, Micrometeorology, Cosmic ray bursts, Distribution, Density, Asteroids, Luminescence, Wake, Emissivity, Measurement, Upper atmosphere.

AD-417 201 Div. 2
(TISTP/FEM) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
ATMOSPHERIC STRUCTURE AND ITS VARIATIONS IN THE LOWER THERMOSPHERE,
by Kenneth S. W. Champion. June 63, 20p.
AFCRL Rept. no. 63 873 Unclassified report

Descriptors: (*Atmosphere models, Electron density), (*Ionosphere, Density), Measurement, Satellites (Artificial), Drag, Spheres, Rockets, Accelerometers, Experimental data, Scattering, Chemicals, Ionization, Physical properties, Atmosphere temperature, Particles.

This is a report prepared for the intermediate altitude region (the lower thermosphere, lying between about 100 and 200 km). This region differs considerably from the lowest one, in which the volume of data makes statistical methods of analysis appropriate. For the highest region, a considerable amount of satellite data is available and the behavior of the atmosphere is reasonably well understood. Some rocket data is available for the lower thermosphere, but most of the measuring instruments are experimental and a major part of the data analysis consists in studying the physics of the various corrections or calibration factors required. At the upper end of the altitude regime some satellite data is available. New density data includes the results from flights of two types of falling spheres, results from the diffusion of chemical clouds, and data from drag effects on three satellites with perigee altitudes near 200 km. The satellite data indicates a dependence of density on the value of the magnetic A sub p index. Otherwise, the data shows more variation with the method of measurement and data reduction than actual variation of the atmosphere. (Author)

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-417 206 Div. 2, 25
(TISTP/WH) OTS price $5.60

Texas A. and M. Coll., College Station.
AN EVALUATION OF HEAT FLOW TRANSDUCERS AS A MEANS OF DETERMINING SOIL HEAT FLOW,
by Barney L. D. King. Aug 63, 46p.
Contract DA36 039AMC02195(E)
Unclassified report

Master's thesis.

Descriptors: (*Heat transfer, Soils), (*Soils, Heat transfer), (*Transducers, Thermocouples), Albedo (Astronomy), Thermodynamics, Micrometeorology, Measurement theory.

From data the author obtained on the Dallas Tower Program, an investigation is made of the responses of several newly-designed heat flow transducers in the soil under varying meteorological conditions. The Fourier heat conduction equation is used as a standard in evaluating the transducers' ability to represent surface soil heat flow. The results show that acceptable performance of the plates in the measurement of heat flow is possible although in general should not be expected without thorough testing, and even then there are restrictive considerations, primarily in depth of placement. This holds for averaging periods as short as 15 min, although better results are obtained with longer time intervals. The results also show that the new transducers are much more accurate than the older standard types, and that consistent variations in response are not introduced by variations in soil moisture. (Author)

AD-417 213 Div. 2, 25
(TISTP/WH) OTS price $8.10

Ohio State U., Columbus.
THE STANDARD BASE LINE AND AN INVESTIGATION OF READING ACCURACY IN BASE LINE MEASUREMENT WITH INVAR WIRES,
by William Henry Carpenter, Jr. 1963, 72p.
Unclassified report

Master thesis.

Descriptors: (*Geodesics, Surveying), (*Interferometers, Geodesics), (*Distance measuring equipment, Wire), Calibration, Nickel alloys, Chromium alloys, Surveying.

Contents -- Introduction: Purpose of the standard base line; Uses of the standard base line. History Of The Standard Base Line: Nummela standard base line; Buenos Aires standard base line; Loernermark standard base line; Munich standard base line; Portugal standard base line. Measurement Of The Standard Base Line: The Vaisala light interference comparator; Method of base line measurement. The North American Standard Base Line: Establishment of a standard base line; Selection of site; Proposed sites for the standard base line. Investigation of Reading Accuracy in Base Line Measurement with Invar Wires.

AD-417 323 Div. 2
(TISTP/FEM) OTS price $1.10

Aerospace Information Div., Washington, D. C.
PHOTOELECTRIC SELF-RECORDING DAY-SKY PHOTOMETER AND INDICATRIX OF THE SCATTERING OF LIGHT IN THE EARTH'S ATMOSPHERE, INCLUDING SMALL ANGLES OF SCATTERING.
5 Aug 63, 5p.
AID Rept. no. T63 104 Unclassified report

Trans. from Akademiya nauk Kazakhskoy SSR. Astrofizicheskiy Institut. Trudy, v. 3, pp. 62-65, 1962.

Descriptors: (*Sky brightness, Recording systems), (*Photometers, Automatic), Reflection, Scattering, Light, Atmosphere, Measurement, Photoelectric effect, Amplifiers, Photomultipliers, Optical equipment, Solar radiation.

AD-417 336 Div. 2, 25, 15
(TISTP/HG) OTS price $4.60

Yerkes Observatory, Williams Bay, Wis.
THE STUDY OF HYDROMAGNETIC PROBLEMS BEARING ON GEOMAGNETISM.
Final rept.,
by S. Chandrasekhar. 1 Jan 62, 40p.
Contract AF19 604 2046
AFCRL Rept. no. 62 1075
Unclassified report

Descriptors: (*Abstracts, Terrestrial magnetism), (*Bibliographies, Terrestrial magnetism), (*Magnetohydrodynamics, Bibliographies), Hydrodynamics, Thermodynamics, Plasma physics, Mathematical analysis, Stability.

AD-417 374 Div. 2
(TISTP/FEM) OTS price $1.60

Air Weather Service, Scott Air Force Base, Ill.
TERMINAL FORECAST REFERENCE FILE. PART 3.
June 63, 15p.
Unclassified report

Descriptors: (*Meteorological charts, Atmosphere temperature), (*Meteorological parameters, Records), Climatology, Wind, Barometric pressure, Temperature, Weather forecasting, Atmospheric precipitation, Visibility, Cloud cover.

Data taken from the Uniform Summary of Weather Observations for the period Jan. 1953 through Dec. 1962 except for the absolute maximum and absolute minimum temperatures, which were for the period Nov. 1939 through Dec. 1962. (Author)

AD-417 441 Div. 2
(TISTP/FEM) OTS price $8.10

Air Force Cambridge Research Labs., Bedford, Mass.
MESOSPHERIC WINDS FROM 23 SUCCESSIVE HOURLY SOUNDINGS,
by Robert W. Lenhard, Jr. and John B. Wright.
July 63, 81p.
Proj. 6682
AFCRL 63 836 Unclassified report

Descriptors: (*Atmosphere, Sounding rockets), (*Atmospheric sounding, Wind), (*Atmospheric tides, Measurement), Meteorological radar, Radar tracking, Balloons, Atmosphere models, Velocity, Diurnal variations, Stratosphere, Experimental data, Errors, Tables, Spheres, Falling bodies, Harmonic analysis, Oscillation, Meteorological balloons, Meteorological phenomens.

Wind information between 30 and 70 km was obtained from 23 successive hourly rocket soundings. The sensor was a 1-m mylar balloon (ROBIN) tracked by FPS-16 radar. Equations for the component wind speed are developed from the basic equations of motion of the balloon and appropriate simplifications. The balloon velocities and accelerations from which winds are derived are

obtained by linear smoothing techniques applied to radar-observed position and derived velocity data. The smoothing technique is described in detail. This data reduction process yields wind with an rms vector error of 2 mps at the top of the sounding, decreasing as the balloon falls so that a representative value is about 1 kt. The errors increase in the case of an uninflated balloon to 5 mps maximum and 5 kt for the representative value. The variance of the observed winds is largely accounted for by diurnal and semidiurnal oscillations. The amplitude of the oscillations increases with altitude and is greater for the diurnal than for the semidiurnal oscillation. These oscillations result in a greater lag variability of wind at 8 to 12 hr than at 24 hr lag. Comparison of the residual variance at several levels suggests the existence of a turbulent zone in the upper ozonosphere. (Author)

AD-417 442 Div. 2
(TISTP/FEM) OTS price $3.60

Lamont Geological Observatory, Palisades, N. Y.
GEOMAGNETIC OBSERVATIONS ON FLETCHER'S ICE ISLAND - T-# APRIL 18 TO SEPTEMBER 11, 1961,
by James C. G. Walker. July 63, 15p. Scientific rept. no. 6
Contract AF19 604 7442, Proj. 7628, Task 762805
AFCRL 63 615 Unclassified report

Descriptors: (*Magnetic fields, Measurement), (*Geophysics, Polar region), Magnetometers, Magnetism, Tables, Diurnal variations, Intensity, Solar disturbances.

Values of the total intensity of the geomagnetic field are presented. The measurements were made in the Arctic Ocean at latitude 72 degrees N, longitude 160 degrees W. The mean daily variation is given for quiet, disturbed, and all days. (Author)

AD-417 451 Div. 2, 20
(TISTP/FEM) OTS price $5.60

Geophysical Inst., U. of Alaska, College.
MAGNETIC, TELLURIC CURRENT, AND VLF OBSERVATIONS DURING THE 'FISH BOWL' TESTS OF 1962,
Special rept.,
by Keith B. Mather and Eugene M. Wescott. Jan 63, 1v. Rept. no. UAG R140
Contract AF19 604 6180, Proj. 8653
AFCRL 63 305 Unclassified report

Descriptors: (*Nuclear explosions, High altitude), (*Magnetic fields, Nuclear reactions), (*Very low frequency, Recording systems), Magnetism, Magnetometers, Oscillation, Records, Intensity, Noise, Electromagnetic waves, Background, Electrodes, Instrumentation.

This paper describes results obtained with magnetic, telluric current, and 5 KC VLF equipment in Alaska, New Zealand and Shepherd Bay in Canada, during Johnston Island nuclear tests. Simultaneous conjugate data were obtained at Oamaru, N.Z. AND Cold Bay, Alaska. The detonations caused initial field oscillations of 2.5 - 3 sec. period followed by longer period oscillations. (Author)

AD-417 461 Div. 2
(TISTP/FEM) OTS price $4.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
SOLAR RADIOFLUX AND UPPER-ATMOSPHERE TEMPERATURE,
by M. Nicolet. 1 Oct 63, 44p. Scientific rept. no. 195
Contract AF19 604 4563, Proj. 8605, Task 860502
AFCRL 63 844 Unclassified report

Descriptors: (*Atmospheric temperature, Upper atmosphere), (*Solar radiation, Atmosphere), Density, Ultraviolet radiation, Sunspots, Heating, Air, Solar flares, Solar spectrum, Ultrahigh frequency, Superhigh frequency, Tables, Oscillation, Cooling, Atmosphere models, X rays.

A general analysis of solar radiofluxes between 1,000 Mc/s and 10,000 Mc/s has been made for an entire solar cycle. It is shown that a correlation between a solar radioflux index and the temperature of the thermopause can be found in the range of 8 cm - 10 cm if its basic component is associated with a 27-day mean value. A linear correlation is found between the 27-day mean value of the 8 cm radioflux and the thermopause temperature. However, there is a departure from linearity at 10.7 cm for fluxes of less than 150 units. The oscillation during a so-called 27-day period has a value which is about 50 percent of that of basic component. It is shown that no corpuscular effect is needed in addition to the normal heating of the thermosphere by ultraviolet radiation. A table is given to deduce the relationships between radiofluxes at 8 cm and 10 cm and average night-time and daytime temperatures. Finally, the maximum, mean and minimum temperatures have been deduced for night-time and daytime conditions between 1952 to 1962. (Author)

AD-417 496 Div. 2
(TISTP/FR) OTS price $2.60

Rome U. (Italy).
IONIC MOBILITY IN COLD PLASMAS.
Final technical rept., 1 Dec 61-31 Nov 62,
by G. Careri. 31 Nov 62, 18p.
Contract DA91 591EUC2031
Unclassified report

Descriptors: (*Ions, Helium), Helium, Liquefied gases, Electric fields, Velocity, Rotation, Motion, Ionization chambers.

Investigation of the properties of ions in liquid helium, and the use of helium ions in experiments on the rotation of liquid helium are discussed. All the work was carried out at temperatures in the helium II region, that is below 2.19 K. The behaviour of the positive and negative ions and their interaction with their solvent was studied through measurements of the mobility at various temperatures and applied electric fields. The experiments on rotating liquid helium are described and are grounded on the study of the space charge effect of a beam of negative charges. (Author)

AD-417 573 Div. 2
(TISTP/FR) OTS price $2.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
AN ANALYSIS OF WIND SHEAR DIFFERENCES AS MEASURED BY AN/FPS-16 RADAR AND AN/GMD-1B RAWINSONDE,
by Roy E. Sandlin, Jr. Aug 63, 24p.
Task 1 A 0 11001 B 021 10
AERDA 68 Unclassified report

Descriptors: (*Wind, Measurement), High altitude, Measurement, Radiosondes, Radar reflectors, Radar tracking.

Wind shear in the lower 35,000 feet (11 km) of

the atmosphere has been investigated with AN/FPS-16 radar by tracking small corner reflectors attached to standard rawinsonde flights. An analysis of a selected group of flights during the 1962-63 winter season at White Sands Missile Range, New Mexico, has revealed significant differences in values of wind shear as computed from AN/GMD-1B equipment. The horizontal components of shear as measured by AN/FPS-16 radar are investigated in 100-, 300-, 600-, and 1000-foot thickness layers. Shear values from AN/FPS-16 data are found to be significantly greater than AN/GMD-1B values in 300- and 600-foot increments but become insignificant in 1000-foot increments. No comparison between AN/FPS-16 radar and AN/GMD-1B is attempted in 100-foot thickness layers. (Author)

AD-417 691 Div. 2
(TISTP/FR) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
COMMENTS ON GEODYNAMIC CONSTANTS,
by Roman K. C. Johns. 19 Aug 63, 18p. Rept. no. TDR269 4550 10 1
Contract AF04 695 269
SSD TDR63 208 Unclassified report

Descriptors: (*Satellites (Artificial), Gravity), Earth, Orbital trajectories, Drag.

Existing values of certain geodynamic constants determined from satellite data are reviewed and their reliability is assessed. It is the viewpoint of the author that, due to uncertainties of both numerical values and the interpretation of satellite data, it is now premature to consider high-order mass functions as being known and established. The discussion includes the question of representing gravity anomalies by tesseral harmonics so derived. The complexity of translating gravipotential satellite data into the geometrical shape of the earth is indicated. Objectives for further study are given and experimental programs are suggested. (Author)

AD-417 769 Div. 2, 25
(TISTP/MH) OTS price $5.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DETERMINATION OF RARE AND TRACE ELEMENTS IN SOILS, PLANTS AND WATERS,
by T. F. Borovik-Romanova, and Yu. I. Belyayev. 25 Apr 63, 50p.
FTD TT63 280 Unclassified report

Descriptors: (*Soils, Rare earth elements), (*Rare earth elements, Determination), Plants, Water, Sampling, Furnaces, Solutions, Inorganic compounds, Hydrochloric acid, Ammonium compounds, Salt, Spectrum analysis, Spectrosco7y, Cesium, Lithium, Rubidium, Barium, Strontium, Bismuth, Molybdenum, Beryllium, Cadmium, Gadolinium, Germanium, Hafnium, Lead, Molybdenum, Niobium, Tantalum, Tin, Tungsten, Zinc, Zirconium.

AD-417 783 Div. 2
(TISTP/MFA) OTS price $8.10

Ohio State U., Columbus.
DE GRAAF-HUNTER'S MODEL EARTH ANOMALIES,
by David Warren Saunders. 1963, 75p.
Contract AF23 601 3549, Proj. 1411
Unclassified report

Master's thesis.

Descriptors: (*Geodesics, Earth models), Theory, Gravity, Terrain, Surface, Earth, Tables, Mapping, Height finding.

Several new theories on geodesics have been advanced. One of these, The Model Earth with Smoothed Topography, proposed by J. de Graaff-Hunter, is the object of this thesis. The author attempts to do the following: (1) Explain the Model Earth theory. (2) Demonstrate a computational method for; (a) the model earth elevations, and (b) the model earth gravity anomaly. (3) Analyze the relationship between and compare the model earth anomaly with an isostatic anomaly and two types of free air anomalies (reduced to mean elevation rather than to the geoid). (4) Draw any legitimate conclusions which may be found in the body of the thesis. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

No Entries

4. CHEMISTRY

AD-417 216 Div. 4
(TISTM/EJH) OTS price $3.60

Washington State U., Pullman.
THE MEASUREMENT OF SHORT TRANSIENTS IN A FUSED SALT ELECTROLYTIC REACTION,
by Richard Andrew de la Veaga. 1963, 27p.
Unclassified report

Master's thesis.

Descriptors: (*Electrolysis, Sodium compounds), (*Electrodes, Electrolysis), (*Salts, Electrolysis), (*Sodium compounds, Electrolysis), Electric potentials, Electrochemistry, Hydroxides, Radioactive isotopes, Anodes (Electrolytic cells), Carbon, High temperature research, Melting.

A successful method has been developed to measure the counter-emf, including a short transient, in fused sodium hydroxide after electrolysis. The counter-emf was postulated to be: E sub t = A + B Log (t + C) where A, B, and C are measured constants. Data taken at 500 and 600 C confirm the mathematical model. The departure from the predicted behavior which occurred at 400 C is possibly due to a non-chemical process. A comparison of data taken at 600 C using both radioactive and stable anodes indicates that radioactivity lowers the cell counter-emf. It is possible that this is attributable to a capacitance effect. Calculated values for A, B, and C, and the initial counter-emf are included for each temperature observed. (Author)

AD-417 325 Div. 4, 20
(TISTM/AMS) OTS price $1.10

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena.
THE PROTON NMR SPECTRUM OF 2,2-DIBROMOCYCLOBUTANONE,
by Kenneth L. Servis and John D. Roberts. Aug 63, 6p. Technical rept. no. 25
Contract Nonr22026, Proj. NR055 388
Unclassified report

Descriptors: (*Organic compounds, Nuclear magnetic resonance), Cycloalkanes, Carbonyl group, Bromides, Protons.

AD-417 326 Div. 4, 25
(TISTM/AMS) OTS price $1.10

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech, Pasadena.
THE DEGENERATE COPE REARRANGEMENT OF TRICYCLO 3.3.1.04,6 NONA-2,7-DIENE-9-ONE,
by Joseph B. Lambert. Aug 63, 6p. Technical rept. no. 26
Contract Nonr220 26, Proj. NR055 388
Unclassified report

Descriptors: (*Organic compounds, Nuclear magnetic resonance), Cycloalkanes, Polycyclic compounds, Molecular structure.

AD-417 327 Div. 4, 25
(TISTM/AMS) OTS price $1.10

Olin Mathieson Chemical Corp., New Haven, Conn.
THE STRUCTURE OF ISOCARBORANE.
by Hansjuergen Schroeder and George D. Vickers. Aug 63, 3p. Technical rept. no. 19
Contract Nonr339500, Proj. NR356 431
Unclassified report

Descriptors: (*Organic compounds, Molecular structure). (*Organoboranes, Nuclear magnetic resonance). Molecular isomerism, Nuclear magnetic resonance, Crystal structure.

AD-417 348 Div. 4, 25
(TISTM/ODN) OTS price $1.10

Birmingham U. (Gt. Brit.).
MICROWAVE SPECTROSCOPIC STUDIES OF MOLECULES,
by J. Sheridan. 18 July 63, 9p.
Grant AF EOR62 1
AFOSR 5270 Unclassified report

Descriptors: (*Microwave spectroscopy, Organic compounds), (*Organic compounds, Microwave spectroscopy), Absorption spectrum, Aliphatic compounds, Alkynes, Halogenated hydrocarbons, Molecules, Dipole moments, Organic nitrogen compounds, Microwave frequency.

A summary is given of the progress of microwave spectroscopic studies of the properties of several molecules in the period 1 January 1962 to 31st Dec. 1962. Approximately 180 absorption lines were measured for acetyl acetylene, fifty of which were assigned to give accurate rotational constants. A preliminary analysis was made of the splittings due to internal rotation of the methyl group. Work was begun on deuterated species of this substance. Preliminary values of the a- and b-components of the dipole moment were obtained. About 100 lines were measured for trifluoroethylene, and work on a tentative assignment was begun. Preliminary work on the linear molecules iodo-cyanoacetylene and bromo-cyanoacetylene was also initiated in the period covered. (Author)

AD-417 482 Div. 4
(TISTM/AM) OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
THE VISCOSITY AND FLOW MECHANISM OF POLYMERS WITH DISPERSE FILLERS,
by G. M. Bartenev and N. V. Zakharenko, tr. by Ingeborg V. Baker. 2 Sep 63, 16p.
RSIC Rept. no. 51 Unclassified report
Trans. from Kolloidnyi Zhurnal, 24:1, pp. 121-127, 1962.

Descriptors: (*Polymers, Viscosity), (*Viscosity, Polymers), Equations, Carbon black, Rubber, Synthetic rubber, Butyl rubber.

The basic practical value of introducing dispersed fillers into polymeric materials is their strengthening effect, strongly evident particularly in carbon black filled raw rubber, the durability of which drastically increases in comparison with pure raw rubber. In this connection much effort has been devoted to clarifying the structures of active fillers in raw rubber mixtures and the physicochemical causes of the strengthening effects. (Author)

AD-417 524 Div. 4, 1, 2
(TISTM/AMS) OTS price $7.60

MSA Research Corp., Callery, Pa.
HYDROGEN GENERATION FOR HIGH ALTITUDE BALLOONS.
Rept. no. 4 (Final), 1 July 62-30 June 63,
by W. J. Carter and M. J. McGoff. 3 Sep 63, 75p.
Rept. no. MSAR63 109
Contract DA36 039sc90699, DA Proj. 3M36 21 004 02
Unclassified report

Descriptors: (*Hydrogen, Meteorological balloons). (*Meteorological balloons, Hydrogen). (*Gas-generating systems, Hydrogen). High altitude, Sodium compounds, Hydrides, Boron compounds, Borides, Aluminum compounds, Design, Specifications, Life expectancy, Storage, Safety, Gases, Human engineering, Tests, Catalysts, Model (Simulations). Cost, Calcium compounds, Data, Military requirements.

A study and experimental program resulted in the design, fabrication and supply of a Hydrogen Generator (Development Model) and $NaBH_4$ and $NaAlH_4$ charges for use by the Army to fill high altitude balloons. A maximum of 270 SCF of 99% quality H_2 can be produced within 30 minutes through the reaction of either six $NaBH_4$ or six $NaAlH_4$ charges with H_2O. Each charge produces 45 SCF of H_2. Primary emphasis of investigation was placed on $NaBH_4$ and $NaAlH_4$. The ease with which the $NaAlH_4$ charge can be used in either generator and its anticipated low unit cost, $5.00/lb at production capacities of over 50,000 lb/yr, makes it more attractive than $NaBH_4$. Hydrogen evolutions from $NaBH_4$ are affected by water temperature, require a catalyst and a closed system to contain the foam and prevent the escape of H_2 to the atmosphere. (Author)

AD-417 633 Div. 4, 25
(TISTM/ODN) OTS price $2.60

North Carolina U., Chapel Hill.
A MOLECULAR ORBITAL TREATMENT OF THE SPECTRUM OF $TiF_6^{(3-)}$,
by Helen D. Bedon, Sally M. Horner, and S. Y. Tyree, Jr. 1 Sep 63, 21p. Technical rept. no. 12
Contract Nonr85505, Task 052 371
Unclassified report

Descriptors: (*Complex compounds, Atomic energy levels), (*Atomic orbitals, Complex compounds), (*Titanium compounds, Complex compounds), Fluorides, Chemical bonds, Ammonium compounds, Ions, Sodium compounds, Potassium compounds, Configuration, Optical phenomena, Functions, Theory, Ionization, Valence, Atomic properties, Molecular properties, Electrons.

Electronic energy levels for complex $TiF_6^{(-3)}$ ions have been calculated using a molecular

orbital scheme, assuming ideal octahedral coordination, taking into account pi-bonding, but not considering ligand-ligand interactions. The inclusion of pi-bonding is shown to be most important when the calculated energy levels are compared with the observed spectra of compounds containing the complex. The observed spectra of $(NH_4)_3TiF_6$, Na_2KTiF_6, and NaK_2TiF_6 show two bands at 15-16,000 and at 18,900 reciprocal cm. The value of 17,500 reciprocal cm for 10 Dq obtained from the calculated energy levels compares very favorably with the observed spectra, the splitting being attributed primarily to Jahn-Teller distortion of the excited state. (Author)

AD-417 656 Div. 4
(TISTE/AAR) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
APPARATUS FOR REPEATED AUTOMATIC EXTRACTION OF POROUS SOLIDS WITH HOT SOLVENT,
by Dale A. Clark. June 63, 4p.
Task 775301
SAM B TDR63 42 Unclassified report

Descriptors: (*Solids, Separation), Solvents, Laboratory equipment, Chromatographic analysis, Automatic, Porous materials, Condensers, Cooling, Coils.

Apparatus is described to effect extraction of bulky solids with hot solvents. The extraction chamber is heated by boiling solvent vapors and filled by condensation of those vapors. When filled with solvent, the extraction chamber is emptied automatically by a siphon, as in a conventional Soxholet extractor. A novel condenser provides a large and flexible connection to the extraction chamber and avoids the use of glass joints and the attendant hazard of breakage. The entire apparatus is useful for repeated automatic extraction of various solid materials with fresh batches of hot solvents--as, for example, in the hot extraction of glass fiber or cellulose paper to be used in chromatography. (Author)

AD-417 705 Div. 4, 25
(TISTM/AM) OTS price $8.60

General Dynamics, Fort Worth, Tex.
ELECTRON-SPIN MAGNETIC RESONANCE OF FREE-RADICAL INTERMEDIATES IN GAMMA-IRRADIATED HYDROCARBONS,
by J. A. Staples. 12 Apr 63, 93p. Rept. no. NARF63 4T; MR N299
Contract AF33 657 7201
Unclassified report

Descriptors: (*Radiation chemistry, Hydrocarbons), (*Hydrocarbons, Radiation chemistry), Free radicals, Electrons, Spin, Resonance, Alkenes, Gamma rays, Isotopes, Cobalt, Test methods, Waxes, Gamma-ray spectra, Theory, Atomic energy level, Test equipment, Tables, Data.

Results of a study of the character and origin of the electron-spin magnetic-resonance spectra of gamma-irradiated hydrocarbon compounds are presented. The compounds examined include selected alkanes, alkenes, alkynes, branched alkanes, and cycloparaffins. All irradiations and resonance measurements were performed at 77 K. Spectral analysis was directed toward identification of the chemical species responsible for the observed hyperfine patterns. Structural interpretation was confined to free-radical species resulting from carbon-hydrogen and carbon-carbon bond scission in the parent molecule. These results are incorporated into an evaluation of the current status of free-radical spectra from irradiated hydrocarbons. (Author)

5. COMMUNICATIONS

AD-417 136 Div. 5
(TISTE/JBM) OTS price $.75

Harry Diamond Labs., Washington, D. C.
A MINIATURE TUNABLE SHORT-WAVE RECEIVER,
by Edwin H. Harrison, Jr. and George R. Yetter.
14 Aug 63, 29p.
Proj. 96300
HDL TR1160 Unclassified report

Descriptors: (*Radio receivers, Miniature electronic equipment), (*Miniature electronic equipment, Radio receivers), Performance (Engineering), Tuned circuits, Processing, Resistors, Plating, Printed circuits, Transformers, Variable capacitors, Sensitivity, Tuning devices.

Several miniature tunable short-wave receivers were designed, built, and evaluated, using two types of fabrication techniques. One type used chemically deposited resistors and conductors, with the remainder of the components placed in holes in the glass substrate; the other type used all miniature components mounted on an etched circuit board. Both receiver types have a volume less than 0.5 cu. in. Novel features include a newly developed shielded, dual-section, miniature, variable tuning capacitor and miniature pretuned, toroidal, IF transformers. The receiver has a sensitivity of about 1 microvolt and a power consumption of 12 mw. The tuning range extends from 12 to 18 Mc. (Author)

AD-417 196 Div. 5
(TISTE/JBM) OTS price $3.60

National Bureau of Standards, Boulder, Colo.
PRELIMINARY RESULTS OF UHF AIR-TO-GROUND PROPAGATION MEASUREMENTS,
by Albrecht P. Barsis. July 63, 16p.
Pro . 63 313
ESD TDR63 422 Unclassified report

Descriptors: (*Radio transmission, Air-to-surface), (*Propagation, Ultrahigh frequency), Measurement, Airborne, Aircraft, Attenuation, Radio signals, Terrain, Flight paths, Reflection.

The National Bureau of Standards is engaged in a measurement program of transmissions in the UHF band, which originate from airborne transmitters at a nominal altitude of 23,000 ft above east central Indiana. Several receiving stations within and slightly beyond the radio horizon are used. The data are being analyzed to show long- and short-term transmission loss variations over these paths including estimates of the effects of the flight pattern of the transmitting aircraft on the character of the received signal. Initial results show that long-term variability of basic transmission loss as measured by percentile ranges of hourly or daily medians is essentially in agreement with predictions. The absolute received signal levels, however, are mostly below free-space values for the distances concerned, necessitating detailed terrain analyses along the paths in order to arrive at an appropriate propagation model. The character of short-term fading at the various receiving sites depends quite markedly on the direction of the flight pattern axis. Maximum fading range is observed for the Milwaukee receiving station, where Lake Michigan constitutes an almost ideal reflecting surface. (Author)

AD-417 230 Div. 5
(TISTE/JBM) OTS price $9.10

New York U. Coll. of Engineering, N. Y.
CUMULATIVE DECISION TECHNIQUES FOR ERROR-FREE COMMUNICATION SYSTEMS,
by J. J. Metzner and K. C. Morgan. 15 July 63, 1v. Technical rept. no. 400 82; Scientific rept. no. 14
Contract AF19 604 6168, Proj. 4610, Task 461003
AFCRL Rept. no. 63 330 Unclassified report

Descriptors: (*Pulse communication systems, Digital systems), (*Errors, Pulse communication systems), (*Digital systems, Errors), Effectiveness, Communication theory, Feedback, Probability, Coding.

Efforts concerned the exploration of practicable methods by which the efficiency of error-free, fail-safe, digital communication systems operating over real channels can be raised to yield information rates closer to channel capacity. Emphasis was on cumulative decision techniques. A feedback policy is described which makes the system completely compatible with the cumulative process. Several useful cumulation methods are considered and analyzed, including systems employing binary, null-zone, and continuous-level reception. Some numerical results are presented of certain characteristics of two of the proposed cumulation methods, in order to substantiate and shed further light on portions of the analysis. An overall system performance calculation is also included. (Author)

AD-417 232 Div. 5, 8
(TISTE/JBM) OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
ON THE APPLICATION OF SOME DIGITAL SEQUENCES TO COMMUNICATION.
Final rept.,
by Jack Keil Wolf. Aug 63, 15p.
Proj. 4519, Task 451903
RADC TDR63 314 Unclassified report

Descriptors: (*Communication systems, Digital systems), (*Electric filters, Digital systems), (*Digital systems, Electric filters), Statistical functions, Sequences, Linear systems, Nonlinear systems, Analysis, Bandwidth, Delay circuits.

The effects are discussed of filtering a random binary sequence with certain finite memory, linear and nonlinear filters. The statistical properties of the filtered sequence are considered. In the analysis of linear and nonlinear systems, no new techniques are presented. Instead, standard methods of analysis are used to obtain some new results which have potential applications in communication systems. (Author)

AD-417 387 Div. 5, 8, 6, 30
(TISTE/JWS) OTS price $2.50

Radio Receptor Div., General Instrument Corp., Hicksville, N. Y.
TRANSMITTER GROUP AN/AKA( ),
by Harvey Camer. 1 Apr 63, 96p.
Contract AF33 600 40955, Proj. 4107, Task 410717
ASD TDR63 402 Unclassified report

Descriptors: (*Telemetering transmitters, S-band). Frequency modulation, Radiofrequency amplifiers, Power amplifiers, Frequency multipliers, Varactor diodes, Radiofrequency oscillators, Power supplies, Tests, Test equipment (Electronics).

The development of the AN/AKA( ) microwave telemetry transmitter is reported. The study and development phase related to the design of the equipment is described. In addition, a complete description of the final configuration is included along with typical test data. A method for multiplying the voltage vs. capacity characteristics of a varactor is described along with a derivation of the necessary design equations. In addition, a Figure of Merit for a varactor is defined for frequency modulation application. The presence of a grid structure resonance in present day UHF planar triodes is noted. The effects of these characteristics on transmitter performance are described in detail. (Author)

AD-417 486 Div. 5
(TISTE/JBM) OTS price $1.60

South Carolina U., Columbia.
MULTIPLE INTERNAL REFLECTIONS IN DIELECTRIC PRISMS.
Final rept., 1 Apr 62-30 May 63,
by R. G. Fellers. 31 Aug 63, 7p.
Grant AF AFOSR62 315
AFOSR Rept. no. 5281 Unclassified report

Descriptors: (*Electromagnetic wave reflections, Microwave frequency), (*Microwave frequency, Electromagnetic wave reflections), (*Beams (Electromagnetic), Reflectors), Radio transmission, Prisms (Optics), Antenna radiation patterns, Antennas, Dielectrics, Coupling circuits, Attenuators, Radar duplexers, Surface properties, Power, Radio receivers, Extremely high frequency, Theory.

Research concerned the transmission of microwave beams around right angle corners by use of double curvature reflectors, the evaluation of the effect of multiple reflections in a prism device and computation of near zone antenna fields. A pair of dielectric prisms were used as an adjustable directional coupler, an adjustable attenuator, and a duplexing device. An analysis is given for the case of matched interfaces at the surfaces of the prisms. Theoretical derivation of the power transmitted to receivers located at right angles to the transmitter was carried out. Experimental results at wavelengths of 8.5 millimeters were in very good agreement with the theoretical prediction. (Author)

AD-417 655 Div. 5
(TISTE/JWS) OTS price $4.60

RAND Corp., Santa Monica, Calif.
AIDS FOR THE GROSS DESIGN OF SATELLITE COMMUNICATIO SYSTEMS,
by G. M. Northrop. Aug 63, 38p. Rept. no. P2785
Unclassified report

Descriptors: (*Communication satellites (Active), Communication systems), (*Communication systems, Communication satellites (Active)), Tables, Design, Equatios, Antennas, Gain, Radiofrequency interference, Signal to noise ratio, Ranges (Distance).

Efforts were directed towards compiling a computational aid for designers of communication systems employing earth satellites as active relays. It is intended to be of practical utility; there is no suggestion that the theory of communications or satellites is probed in depth or detail. The fundamental intent underlying this work has been to assimilate in one place most of the nomograms and graphs normally employed in performing the gross design or analysis of a communication system, with emphasis placed on the parametric ranges pertinent to communication satellites. (Author)

AD-417 700 Div. 5, 8
(TISTE/JWS) OTS price $3.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
ELECTRONIC EVALUATION OF VOICE COMMUNICATIONS SYSTEMS,
by Richard E. Fitts. Aug 63, 31p.
Proj. 4540, Task 454001
RADC TDR63 355 Unclassified report

Descriptors: (*Radio communication systems, Intelligibility), (*Intelligibility, Radio communication systems), (*Speech transmission, Intelligibility), Signal-to-noise ratio, Measurement, Radio frequency interference, Speech recognition 9test equipment (Electronics), Low pass filters, High pass filters, Noise.

The evaluation of voice communications systems has traditionally been done by articulation testing using a team of listeners. Although this method is conceptually straightforward it can be time consuming, and there are a number of variables which must be controlled for consistent results. Consequently, electronic evaluation promises savings in time and money if it can be shown to have results equivalent to articulation tests. One electronic evaluation method, the Voice Interference Analysis Set manufactured by General Electronic Laboratories, Inc. was tested to determine if it produced results equivalent to articulation tests. In the laboratory, tones, noise, and pulse interference were mixed in an audio channel and the electronic results compared with articulation tests conducted under similar conditions. Then the results from a field test in which both an electronic evaluation and an articulation test had been run on a voice communication system were analyzed for correlation between the two evaluations. On the basis of these tests, it is concluded that electronic evaluation of voice communications systems is possible subject to certain restrictions. Furthermore, certain theoretical and practical limitations of the Voice Interference Analysis Set are discussed. (Author)

6. DETECTION

AD-417 422 Div. 6, 8
(TISTP/HSS) OTS price $9.10

General Atronics Corp., Conshohocken, Pa.
PULSE STRUCTURES FOR ENHANCED ACCURACY.
Final rept.,
by T. L. Williams. June 63, 94p.
Contract AF30 602 2417, Proj. 4506, Task 450601
RADC TDR63 306 Unclassified report

Descriptors: (*Doppler radar, Numerical analysis), Effectiveness, Radar signals, Target position indicators, Radar pulses, Mathematical analysis, Doppler systems.

The detailed theoretical and experimental data regarding the accuracy of the simultaneous estimates of range and doppler is presented. The utility of the Tangent Approximation Manifold estimator is discussed. The measurements were made with a target simulator (capable of representing two targets plus noise and clutter) and a TAM estimator. The experimental data agrees with the theory except for a few explainable cases. The results definitely prove the advantage of ''Enhanced Accuracy'' waveforms which have no linear frequency modulation. A single TAM estimator is useful only over a region of doppler and range about equal to the resolution of the radar pulse. For the measurement of doppler and range it offers no obvious advantage over a matched filter bank plus an interpolator. But the TAM estimator does provide a measure of multiplicity which is not available from conventional estimators. The multiplicity estimate is useful to indicate the presence of two targets when the two targets are both in the same range and doppler bin. For some applications the multiplicity estimate may be desired, in which case the TAM estimator will be more useful than a conventional estimator. (Author)

AD-417 528 Div. 6
(TISTE/PAR) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A LINEAR-FM RADAR PULSE COMPRESSION SYSTEM EMPLOYING THICKNESS-TAPERED DISPERSIVE DELAY LINES.
by R. C. Yost. 11 July 63, 20p. Technical rept. no. 321
Contract AF19 628 500
ESD TDR63 551 Unclassified report

Descriptors: (*Pulse compression, Radar), Radar pulses, Frequency modulation, Linear systems, Sensitivity, Signals, Doppler system, Errors, Delay lines.

This report describes a radar pulse compression system that employs a linear-FM signal. At the option of the operator, the shape of the signal envelope can be made rectangular, Butterworth, or Gaussian. Ultrasonic dispersive delay lines that are thickness-tapered to provide a linear group time delay characteristic over a frequency band of 2 Mcps are used as the signal expansion and compression devices. Included are the test results of the completed unit with photographs of the waveforms. For the poorest case, the time sidelobes in the receiver output waveform are shown to be 35 db below the peak response. The receiver for the rectangular signal and the receiver for the Butterworth signal are mismatched with accompanying losses in the radar sensitivity of 1.7 db and 0.7 db respectively. An uncompensated Doppler frequency shift of one kilocycle per second will produce an error of 7 feet in the estimate of the range to an echoing object. (Author)

AD-417 572 Div. 6, 8
(TISTP/HSS) OTS price $14.50

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PHASED ARRAY RADAR STUDIES.
Report no. 3, 1 July 61-1 Jan 63,
by J. L. Allen, D. M. Bernella, W. W. Carpenter, W. P. Delaney, and J. DiBartolo. 20 Feb 63, 211p.
Technical rept. no. 299
Contract AF19 628 500
AFESD TDR63 100 Unclassified report

Descriptors: (*Radar antennas, Design), Radar equipment, Test facilities, Microwave equipment, Amplifiers, Radar receivers, Radar transmitters, Test equipment, Radar pulses.

27The project effort is directed toward investigation of components, techniques and the fundamental theoretical limitations of arrays for high-power high-resolution radar applications. Studies of the fundamentals of arrays include consolidation of the mutual coupling theory and studies of the effects of such coupling on unequally spaced arrays. The relationship between transmitter efficiency and transmitted pulsewidth is examined and expressions are derived for minimizing the cost of certain array systems when the per-element costs are known. (Author)

AD-417 628 Div. 6, 8
(TISTE/JWS) OTS price $1.10

Fairchild Space and Defense Systems, Syosset, N. Y.
ALLAC.
Progress rept. no. 3,
by G. Lysle and B. Gaddy. 20 Sep 63, 4p. Rept. no. 1220 70 3
Contract AF33 657 12238
Unclassified report

Descriptors: (*Image tubes, Tests), (*Photoelectric cells (Semiconductors), Diodes (Semiconductor)), Photocathodes, Transistors, Power supplies, Blowers, Test equipment, Drives, Scanning, Prisms (Optics).

7. ELECTRICAL EQUIPMENT

AD-417 130 Div. 7, 1
(TISTA/VGW) OTS price $8.10

Chance Vought Corp., Dallas, Tex.
INVESTIGATION OF CONTACTLESS SWITCHING CONCEPTS FOR APPLICATION TO AIRCRAFT ELECTRICAL SYSTEMS. VOLUME I. AIRCRAFT SYSTEMS REQUIREMENTS.
Final engineering rept., 11 June 62-11 Mar 63,
by L. D. Dickey and A. J. Marek. 11 Mar 63, 85p.
Rept. no. 2 53727 3R449 1
Contract NOw 62 0944
Unclassified report

Descriptors: (*Aircraft equipment, Electric switches), (*Electric switches, Semiconductor devices), Feasibility studies, Electrical properties, Performance (Engineering), Military requirements, Piezoelectric crystals, Electric relays, Design, Electrical equipment.

A study program was conducted to determine the factors that must be considered in the development of contactless switching devices and assemblies for performing the functions presently accomplished by conventional electromechanical switching devices. Problem areas and semiconductor characteristics are discussed in light of aircraft electrical system requirements so that design criteria can be established. A chart comparing characteristics of typical electromechanical switching components to the contactless switching concept is presented. Conclusions are offered concerning the factors to be considered in the development of contactless switching devices and assemblies to be compatible with present and anticipated aircraft electrical system requirements. These factors are discussed for devices and assemblies which will perform the functions of relays, circuit breakers and switches; including switching and control of the primary bus. (Author)

AD-417 131 Div. 7, 1
(TISTA/VGW) OTS price $10.10

Chance Vought Corp., Dallas, Tex.
INVESTIGATION OF CONTACTLESS SWITCHING CONCEPTS FOR APPLICATION TO AIRCRAFT ELECTRICAL SYSTEMS. VOL. III - SYSTEM INVESTIGATIONS AND DEVELOPMENTAL REQUIREMENTS.
Final engineering rept., 11 June 62-11 July 63,
by L. D. Dickey, A. J. Marek and W. M. Drum.
11 July 63, 120p. Rept. no. 2 53727 3R449 3
Contract NOw62 0944
Unclassified report

Descriptors: (*Aircraft equipment, Electric switches), (*Electric switches, Aircraft equipment), Feasibility studies, Design, Electric relays, Power equipment parts, Packaged circuits, Printed circuits, Performance (Engineering), Military requirements, Electrical equipment.

A study program was conducted to establish a system design philosophy for aircraft electrical systems utilizing contactless switching concepts that would provide the necessary power switching, protection and control functions for present and anticipated aircraft requirements. System design and operation, packaging, and assembly and installation requirements were investigated from the aircraft system designer's viewpoint. Design criteria and performance goals are presented for the various components to be used in the contactless switching system. A development program plan is presented for the development of these components. (Author)

AD-417 222 Div. 7
(TISTM/EJH) OTS price $3.60

Weston Instruments Div., Daystrom, Inc., Newark, N. J.
A POROUS SUBSTRATE RESISTOR AIMED AT MINIATURIZATION OF METAL-FILM RESISTORS.
Interim development rept. no. 4 for 1 Apr-30 June 63,
by Theodore Matley. 30 June 63, 33p.
Contract NObsr87542, Proj. SR0080303
Unclassified report

Descriptors: (*Resistors, Manufacturing methods), (*Manufacturing methods, Resittors), Glass resistors, Porosity, Quartz, Heat treatment, Brazing, Metal films, Resistance (Electrical), Silver, Impregnation.

Several parameters necessary for the successful manufacture of porous substrate resistors were established. Specifically, quartz was decided upon as the material of construction and the pore size was determined on the basis of availability and suitability to wattage requirements and resistor dimensions. The optimum temperature of heat treatment was established as 400 F and a method of termination utilizing silver brazing was found to be quite successful. Heat dissipation was related to resistor dimensions and shown to have no correspondence with pore size and/or film thickness. Impregnation as a means of enhancing heat dissipation was investigated with negative results. (Author)

AD-417 245 Div. 7, 8
(TISTE/OHD) OTS price $14.50

Chance Vought Corp., Dallas, Tex.
INVESTIGATION OF CONTACTLESS SWITCHING CONCEPTS FOR APPLICATION TO AIRCRAFT ELECTRICAL SYSTEMS VOLUME II. CONCEPT DESIGN STUDIES.
Final engineering rept., 11 June 62-11 May 63,
by L. D. Dickey, A. J. Marek and W. M. Drum.
11 May 63, 209p.
Contract NOw62 0944c
Unclassified report

Descriptors: (*Electric switches, Airborne), (*Electronic switches, Semiconductor devices), (*Power equipment, Electric switches), Substitutes, Feasibility studies, Switching circuits, Circuit breakers, Relays, Algebras, Theory, Analysis, Design.

A study program was conducted to establish and evaluate contactless switching design techniques for application to aircraft electrical systems. Design concepts utilizing semiconductor devices were investigated to provide an effective and reliable aircraft electrical power switching and

control system. Typical circuits have been designed that will perform the functions of conventional switches, relays and circuit breakers, including switching and control of the primary bus. Breadboards have been constructed and operated to verify the anticipated design performance. Mechanical design characteristics are discussed for the signal sources, control logic and power contacts. Aircraft system design techniques are discussed from the aircraft systems designer's viewpoint, and a preliminary reliability analysis is presented. (Author)

AD-417 332 Div. 7
(TISTE/JBM) OTS price $9.10

Research Labs. for the Engineering Sciences, U. of Virginia, Charlottesville.
RESEARCH STUDIES IN PRECISION SOLID-STATE POWER SUPPLY CIRCUITRY.
Final technical rept.,
by E. S. McVey, G. S. Nurre, R. E. Russell, J. T. Hancock, Jr., and R. R. Brownell. Aug 63, 290p. Rept. no. EE3335 101 63U
Contract DA36 034ORD3664RD
Unclassified report

Descriptors: (*Power supplies, Semiconductor devices), (*Semiconductor devices, Power supplies), Transistors, Crystal rectifiers, Electronic switches, Silicon, Inverter circuits, Reliability (Electronics), Counting methods, Circuits, Pulse modulation, Analysis, Power, Temperature, Frequency, Electric filters, Pulse counters, Equations, Transformation (Mathematics), Feedback, Stability, Electric currents, Electric potential, Voltage regulators.

Research concerned precision solid state power supplies. Logic and drive circuits for inverter applications are discussed and compared on the basis of performance, reliability, and number of components. Two ring counter circuits are analyzed and modifications to improve their reliability are suggested. Two drive circuits are analyzed and compared. A method is developed for using z-transform theory in the stability analysis of certain switch-type feedback systems. The use of the z-transform method makes it possible to find all the limit cycles and their stability for systems containing either a perfect switch, a switch with hysteresis, or a switch with dead zone. The analysis is exact for systems of all orders. (Author)

AD-417 359 Div. 7
(TISTM/BRW) OTS price $1.60

New York State Coll. of Ceramics. Alfred U.
HYDROGEN-OXYGEN ELECTRODE STUDY.
Quarterly progress rept. no. 7.
15 Sep 63, 9p.
Contract AF33 657 7564
Unclassified report

Descriptors: (*Fuel cells, Electrodes). (*Oxygen, Electrodes). (*Hydrogen, Electrodes). (*Electrodes, Preparation). Graphite, Porous materials, Impregnation, Silver compounds, Oxides, Platinum, Electrolytes, Potassium compounds, Hydroxides, Electrical properties, Performance (Engineering), Electrochemistry.

Two types of fuel cells were investigated, a cylindrical electrode cell and a parallel plate electrode cell. A Vacuum Tube Voltmeter (VTVM) and load circuit were employed for preliminary studies of cell performance. Graphite electrodes were used in 30% KOH electrolyte and were examined by optical and electron microscopy and by spectrographic analysis before and after use. Individual electrode performance was studied with a precision load interruption circuit and electrometer preamplifier. A modified A.C. Kelvin bridge was used to provide information on ohmic polarization. Graphite electrodes were impregnated with platinum and silver for hydrogen and oxygen, respectively. At operating temperatures of 25 to 45 C open-circuit potentials of about -1.0 volt for the anode and +0.16 volt for the cathode vs mercury-mercuric oxide were obtained. Current densities of 10-20 ma sq cm were observed at 0.95 volt. (Author)

AD-417 392 Div. 7, 4
(TISTM/AMS) OTS price $2.00

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
FUEL CELLS.
Status rept. no. 4,
by Fritz R. Franke and Herbert F. Hunger.
July 63, 70p.
Unclassified report

Descriptors: (*Fuel cells, Reports), (*Reports, Fuel cells), Scientific research, Energy conversion, Combustion.

This report contains information on fuel cell R&D being performed in the United States and supported by non-Government funds. It is based on information furnished by the organizations engaged in fuel cell work. The report reflects the views of these organizations at the end of 1962. Collective funding data indicate that the reporting organizations spent about six (6) million dollars on their fuel cell programs in 1962. (Author)

AD-417 411 Div. 7, 12, 27
(TISTE/OHD) OTS price $12.50

North American Aviation Inc., Los Angeles, Calif.
POWER CONVERSION AND GENERATION STUDY.
Quarterly progress rept. no. 1, 15 Apr-15 July 63.
15 July 63, 1v. Rept. no. WA63 755 1
Contract AF33 657 11049
Unclassified report

Descriptors: (*Electric power production, Electric propulsion), (*Electric propulsion, Power equipment), (*Generators, Feasibility studies), Inverters, Semiconductor devices, Electron tubes, Frequency converters, Low frequency, Weight.

The general objective of the study program is to investigate both power generation and power conversion techniques. Investigations are proceeding on schedule and have been concentrated in the following major areas during the first three months. (1) Converter and alternator techniques. (2) 60 KW converter design concepts. (3) 300 KW converter design concepts. (4) High frequency generator concepts. (Author)

AD-417 574 Div. 7
(TISTE/JWS) OTS price $2.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
HIGH-TEMPERATURE VAPOR-FILLED THERMIONIC CONVERTER.
Quarterly technical progress rept. for 31 July 63, by W. Godsin and R. Skoff. 26 Aug 63, 22p. Rept. no. GA4511
Contract AF33 657 8563, Proj. 8173, Task 817305 5
Unclassified report

Descriptors: (*Thermionic converters, Cesium), Tests, High temperature research, Power, Uranium compounds, Zirconium compounds, Carbides, Refractory materials, Chemical analysis, Emissivity, Coatings.

Efforts were directed to the evaluation of materials, fabrication, and testing problems associated with the operation of high-temperature vapor-filled thermionic converters employing uranium-zirconium carbide emitters of cylindrical geometry. To date five of these converters have operated a total of 5300 hr. The last converter to be tested in this program is Cell K, which will soon be operable. In this reporting period, Cell H, which had two cesium vials, was placed in operation, while final assembly of Cell K was completed. Cell H output was 56 watts at an emitter temperature of 2380 K. The cesium temperature optimum for maximum power was 637 K. A collector temperature optimum was not obtained due to cooling limitations. (Author)

AD-417 579 Div. 7
(TISTE/OHD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PHASE BREAKER RELAY, E-511.
31 July 63, 2p.
FTD TT63 697 Unclassified report

Trans. from Rele Obryva Faz E-511, p.1

Descriptors: (*Electric relays, Power equipment), Phase distortion.

AD-417 798 Div. 7
(TISTM/AW) OTS price $9.10

Delco-Remy Div., General Motors Corp., Anderson, Ind.
APPLIED RESEARCH INVESTIGATION OF SEALED SILVER-ZINC BATTERIES.
Quarterly technical progress rept. no. 1, 1 May-1 Aug 63,
by J. J. Lander, J. A. Keralla, L. M. Cooke, Paul Scardaville, and T. J. Wetherell. 2 Aug 63, 31p.
Contract AF33 657 10643, Proj. 8173, Task 817304 21
Unclassified report

Descriptors: (*Storage batteries, Design), (*Membranes, Cellulose), Environmental tests, Hydroxides, Sodium compounds, Potassium compounds, Electrolyte, Failure (Mechanics), Lithium compounds, Oxides, Zinc compounds, Cadmium compounds, Diffusion, Equations, Ions, Tables, Resistance (Electrical), Measurement, Electric potential, Solubility, Silver, Permeability, Water.

Cycle life data on cells containing varying ratios of ZnO to silver indicate that increasing the ratio of ZnO to silver tends to increase cycle life. Separator overhang life tests are continuing after 500 cycles without failure. Electrolyte quantity tests at this time are not conclusive in determining maximum cycle life. Additional work is to be done in this area. Cells containing Dynel wrapped negatives do not show consistent cycle life, and on this test, do not deliver as many cycles as the control cells. Additional samples of Dynel will be utilized in new test cells. Solubility curves have been obtained for ZnO and Ag_2O in NaOH, LiOH, and KOH. Literature investigations concerning the use of electrolytes for silver-zinc electrodes other than strong bases are not promising. Test cells utilizing CdO and double grids in the negative plate are still on cycle test. Some failures have occurred around 700 cycles, but no definite conclusions can be reached as yet. Some evaluation tests for separators are under way and early sample materials have been received from both R.A.I. and the Visking Corporation. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-417 138 Div. 8
(TISTE/JBM) OTS price $2.60

Denver Research Inst., Colo.
RESEARCH ON NEW TYPES OF ANTENNA SYSTEMS FOR THE FREQUENCY RANGE 50-1000Mc.
Interim rept. no. 1, 15 June-30 Nov 62,
by James E. Lindsay, Jr. and Warren R. Wheeler.
15 Aug 63, 16p.
Contract NOw62 0519d, Proj. 340
Unclassified report

Descriptors: (*Antennas, Radiofrequency), (*Very high frequency, Antennas), (*Ultrahigh frequency, Antennas), Theory, Equations, Dielectrics, Antenna configurations, Cylindrical bodies, Antenna radiation patterns, Digital computers, Ellipsoids.

Research concerns the design, construction and testing of new types of antenna systems for use in the frequency range 50 to 1000 Mc. Experimental work on antennas consisting of a monopole placed near a circular dielectric cylinder and a square dielectric cylinder is described. The theoretical development of a formula for the circular cylinder case is reviewed. The results of a digital computer solution of this formula correct errors which were made previously. Patterns are shown comparing the theoretical circular cylinder solution and the experimental patterns obtained from both the circular and the square cylinder, thus pointing out the possibility of predicting patterns from a rectangular cylinder by means of the theoretical solution for an elliptic cylinder. (Author)

AD-417 168 Div. 8
(TISTE/JWS) OTS price $1.60

Metrology Engineering Center, Bureau of Naval Weapons Representative, Pomona, Calif.
KLYSTRON OIL BATH.
24 July 63, 10p.
MEC D68 Unclassified report

Descriptors: (*Klystrons, Liquid cooled), (*Coolants, Klystrons), Oils, Mechanical drawings, Cooling and ventilating equipment, Specifications, Operation.

The klystron oil bath provides a means for stabilizing the temperature of a klystron in order to obtain improved amplitude and frequency stability, as compared to conventional forced air cooling with blowers. (Author)

AD-417 172 Div. 8, 7, 5, 22
(TISTP/AW) OTS price $28.50

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
PROCEEDINGS OF SECOND HERO CONGRESS - 1963, ON HAZARDS OF ELECTROMAGNETIC RADIATION TO ORDNANCE, HELD AT THE FRANKLIN INSTITUTE PHILADELPHIA, PENNSYLVANIA, APRIL 30, MAY 1, 2, 1963.
2 May 63, 1v. Rept. no. F B1982
Contract N178 8083
Unclassified report

Descriptors: (*Symposia, Electromagnetic shielding), (*Electromagnetic waves, Hazards), Radiofrequency, Radiofrequency pulses, Ordnance, Radio fields, Electromagnetic pulses, Electromagnetic fields, Explosives initiators, Sensitivity, Radiation hazards.

AD-417 181 Div. 8
(TISTE/OHD) OTS price $5.60

New York U., Coll. of Engineering, N. Y.
THE EFFECTS OF NETWORK SHAPING AND LOADING ON THE TRANSIENT AND FREQUENCY RESPONSE OF DISTRIBUTED RC NETWORKKS,
by M. S. Ghausi and G. J. Herskowitz. Aug 63, 49p. Technical rept. no. 400 71
Contract AF19 628 379, Proj. 5628, Task 562801
AFCRL 63 329 Unclassified report

Descriptors: (*Electrical networks, Resistors), (*Transients, Capacitors), (*Frequency, Circuits), Mathematical analysis, Theory, Special functions (Mathematics), Bandwidth, Experimental data.

In this paper the effect of network shaping and loading on the transient and frequency response of distributed RC networks is examined analytically and experimentally. It is shown that both the shaping and loading have significant effects on the performance of distributed RC networks. Experimental work shows good agreement with the theoretical results. (Author)

AD-417 184 Div. 8
(TISTP/WH) OTS price $1.10

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DESIGN CURVES FOR A CIRCULAR POLARIZER,
by W. C. Danforth, Jr. and L. J. Ricardi.
19 Aug 63, 8p. Rept. no. 61G1
Contract AF19 628 500
AFESD TDR63 108 Unclassified report

Descriptors: (*Radiowaves, Waveguides), (*Waveguides, Propagation), (*Polarization, Electromagnetic waves), Tables, Transducers.

A common method of producing a circularly-polarized wave in a constant cross section waveguide consists of exciting two waves which are linearly polarized and mutually orthogonal. Adjusting the relative phase velocity of the two waves enables one to produce a single wave which is circularly polarized. Occasionally it is desired to produce right-hand circular polarization at one frequency and left-hand circular polarization at another. The design parameters are usually the ratio of cut-off wavelengths of the two waves, the length of the polarizing section and the frequencies of operation. The theory of operation and a set of design curves showing the relationship between the parameters are presented. (Author)

AD-417 190 Div. 8
(TISTE/OHD) OTS price $7.60

Boeing Scientific Research Labs., Seattle, Wash.
POWER SPECTRAL DENSITY ESTIMATES OF THE FADING OF HIGH FREQUENCY RADIO WAVES,
by D. H. Schrader. May 63, 65p. Rept. no. D1 82 0244
Unclassified report

Also available from the author.

Descriptors: (*Attenuation, High frequency), (*Radiofrequency spectroscopy, Determination), Mathematical prediction, Digital computers, Analog computers, Propagation.

The power spectral density of the fading power of high-frequency radio waves and methods of estimating this function are the subject of this report. Evaluations of the power spectral density estimates obtained by two different

methods are made. The asymptotic low-frequency variation of estimates computed on a digital commputer and the expected value of estimates computed with an analog computer are derived. A comparison of the two methods is made and power spectral density estimates computed by both methods are shown. Power spectral density estimates are shown for eight different data samples. In general, the power density is confined to frequencies below one cycle per second. (Author)

AD-417 218 Div. 8
(TISTW/HSS) OTS price $9.60

Pittsburgh U., Pa.
POSITIVE-FEEDBACK CLOSED-LOOP POLES IN POSITIVE NEGATIVE FEEDBACK CONTROL SYSTEMS,
by John Paul Hyde. 1963, 108p.
Unclassified report

Master's thesis.

Descriptors: (*Feedback, Control systems), (*Switching circuits, Feedback), Polynomials.

AD-417 236 Div. 8
(TISTP/FEM) OTS price $5.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
THE IONOSPHERIC CONDITIONS,
by Marcel Nicolet and William Swider, Jr.
10 Sep 63, 49p. Scientific rept. no. 193
Contract AF19 604 4563, Grant G18983, Proj. 8605 Task 860502
AFCRL 63 834 Unclassified report

Descriptors: (*Ionosphere, Recombination reactions), (*Ionization, Ionosphere), Dissociation, Nitrogen, Oxygen, Ions, Electron density, Photons, Physics, Chemistry, Solar radiation, Solar spectrum, Atmosphere models, Atomic properties, Molecular association, Absorption, X rays, Cosmic rays, Hydrogen, Helium, Chemical reactions.

A general analysis of ionospheric conditions has been made in the light of possible ionic reactions occurring in the upper atmosphere. Data obtained on various parameters, such as the ionic production and recombination, show that precise knowledge of the spectral distribution of solar radiation is needed and that other experimental determinations on the dissociative recombinations are required. The altitude distribution of ions is exemplified by discussing the relative importance of various loss coefficients in the D, E and F regions. It is seen that molecular nitrogen ions are subject to important charge transfer processes, that nitric oxide ions are always final products destroyed only by dissociative recombination. Additionally, the entire production of atomic oxygen ions is related to the photoionization of molecular nitrogen. In the absence of enough experimental information on ionic processes it is shown that a precise analysis of the ionospheric behavior remains highly speculative. (Author)

AD-417 243 Div. 8
(TISTP/FEM) OTS price $4.60

Illinois U. Engineering Experiment Station, Urbana.
SOME RELATIONS BETWEEN DIGITIZING PARAMETERS AND CALCULATED STATISTICS OF A WAVEFORM,
by Robert McAulay. 15 Aug 63, 36p. Technical rept. no. 18, Technical rept. no. 1; Rept. no. RRL208
Contracts Nonr183402 and NObsr89229, ONR Proj. N371 161
Unclassified report

Descriptors: (*Analog-to-digital converters, Errors), (*Digital systems, Statistical functions), (*Sampling, Radio signals), Digital computers, Statistical processes, Probability, Communication theory, Data transmission systems, Signal-to-noise ratio, Fourier analysis, Statistical distributions.

AD-417 247 Div. 8
(TISTE/JBM) OTS price $11.50

CBS Labs., Stamford, Conn.
RESEARCH AND DEVELOPMENT OF SOLID STATE TUNNEL DEVICES AND ARRAYS CAPABLE OF OPERATION AT MICROWATT POWER LEVELS.
Final development rept., 1 June 62-31 July 63. 19 Aug 63, 105p.
Contract NObsr87512
Unclassified report

Descriptors: (*Tunnel diodes, Processing), (*Semiconductor devices, Processing), Diffusion, Semiconductor films, Power, Silicon, Electric currents, Gallium alloys, Arsenic alloys, Time, Capacitance, Aluminum alloys, Oxides, Electrical properties, Sandwich construction, Metal films, Dielectric films, Varactor diodes, Rectifiers, Electron beams, Plating, Tin, Zinc, Alloys, Electron density.

The development is described of a microwatt backward diode on Si with a reverse current of the order of 10nA, a junction capacitance of about 1pF, and a rectification ratio of 100 at 0.15 volts; a microwatt tunnel diode on GaAs with a peak current less than 10 micro A, a peak-to-valley ratio of 6 to 10, and a theoretical switching time of 0.1 micro sec at a junction capacitance of 0.5 pF; some interesting properties of Al-SiO2-Si thin film tunnel devices. These latter devices are useful for application as either rectifiers or as varactors with a high figure of merit. Electron beam technology using a programmed electron beam system employing a flying spot scanner has also been investigated for possible application for the fabrication of such devices. (Author)

AD-417 252 Div. 8
(TISTE/JBM) OTS price $4.60

Microwave Associates, Inc., Burlington, Mass.
GAS DUPLEXER (PINCH EFFECTS).
Final progress rept.,
by Charles S. Ward. 12 Mar 63, 38p.
Contract AF30 602 2401
RADC TDR63 210 Unclassified report

Descriptors: (*Radar duplexers, Microwave equipment), (*Gas discharges, Radar duplexers), Power, Effectiveness, Magnetic fields, Time, Electric fields, Electric arcs, S band, Discharge tubes, Transmit-receive tubes.

Research concerned an investigation and study of the use of various gas discharge confinement mechanisms as gas duplexers leading to the design of a high power microwave duplexer utilizing magnetic fields to improve switching efficiency within the limit of a specified recovery time. The technique used is that of imposing a constant magnetic field across the discharge and perpendicular to the incident micro-

wave electric field. This results in appreciable reductions in recovery time without any deterioration in discharge arc loss. A prototype duplexer utilizing this effect was constructed in S-band for a power level of six megawatts peak - ten kilowatts average. (Author)

AD-417 256 Div. 8, 26
(TISTE/JBM) OTS price $2.60

General Electric Co., Owensboro, Ky.
7486 CERAMIC TRIODE PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept. no. 4, 1 Apr 63-30 June 63,
by J. D. Marshall. 30 June 63, 18p.
Contract DA 36 039 SC 86738
Unclassified report

Descriptors: (*Triodes, Production), Vacuum apparatus, Processing, Tests, Life expectancy, Industrial equipment, Test equipment (Electronics).

Efforts were continued on the establishment of a production engineering measure for ceramic triodes. The vacuum system was delivered and installed. Prove-out is complete and processing schedules are being established. Design changes were incorporated in tubes. Life testing of these tubes was started and a lot was withdrawn to be supplied as the second engineering sample. (Author)

AD-417 270 Div. 8, 26
(TISTE/JBM) OTS price $1.60

McCoy Electronics Co., Mt. Holly Springs, Pa.
INDUSTRIAL PREPAREDNESS MEASURE. MANUFACTURE OF GLASS HOLDER CRYSTAL UNITS CR-(XM-17)/U.
Quarterly progress rept. no. 7, 1 July-31 Sep 62.
31 Sep 62, 12p.
Contract DA36 039sc81269
Unclassified report

Descriptors: (*Crystal holders, Production), (*Quartz resonators, Production), (*Production, Quartz resonators), Processing, Manufacturing methods, Industrial equipment, Seals (Stoppers), Glass, Vacuum apparatus.

Efforts were continued on the development of a process for producing the CR-(XM-17)/U glass holder crystal unit. Both natural and cultured quartz are to be utilized in the fabrication of the units. A facility capable of sealing five hundred glass holder units per eight hour shift is to be established. The sealing equipment and procedures are discussed. No significant difficulties were encountered with the operation of the r-f induction equipment and accessories. The HC-(XM-2)/U holder dimensions are reviewed with proposed changes. (Author)

AD-417 279 Div. 8
(TISTE/JWS) OTS price $2.60

Field Emission Corp., McMinnville, Oreg.
DEVELOPMENT OF A MILLIMETER WAVE GENERATOR USING A FIELD EMISSION CATHODE,
by J. P. Barbour and F. M. Charbonnier. Aug 63, 21p.
Contract AF30 602 2872, Proj. 5573, Task 557303
RADC TDR63 317 Unclassified report

Descriptors: (*Microwave oscillators, X band), (*Electron guns, Cathodes (Electron tubes)), (*Klystrons, Field emission), (*Cathodes (Electron tubes), Field emission), Coatings, Zirconium, Tungsten, Cavity resonators, Electron beams, Mechanical drawings, Magnetic fields, Electric fields, Focusing.

A six-month feasibility study is reported which has two basic objectives: first, to develop and test an X-band oscillator with a field emission cathode; and second, to determine if an electron gun using a field emission cathode can be developed which will generate an electron beam of suitable diameter and conductance for a 70 gc oscillator. A floating drift tube klystron was chosen as the most suitable device. Two 1-3/4 mode tubes were designed and tested. The beam conductance required to start the oscillators agreed well with the calculated starting conductance, and a peak output power of 16 watts was obtained. Several electron gun designs were investigated and results indicate that a beam of less than one fourth millimeter diameter, with three times the beam conductance required to operate the X-band oscillators, can be obtained with a field emission cathode. These characteristics would be adequate for a floating drift tube klystron operating at 70 gc. (Author)

AD-417 280 Div. 8, 15
(TISTP/WH) OTS price $1.60

Syracuse U., N. Y.
PROBABILISTIC CIRCUIT THEORY - AN APPLICATION OF JENSEN'S THEOREM,
by F. M. Reza. Aug 63, 8p.
Contract AF30 602 2867, Proj. 8505
RADC TDR63 329 Unclassified report

Descriptors: (*Networks, Synthesis), (*Electrical impedance, Mathematics), Complex numbers, Inequalities.

This paper deals with the application of Schwarz's Lemma and Jensen's Inequality to the driving-point impedance of linear passive circuits. Some basic restrictions on the active power dissipated by a family of linear passive networks are derived. (Author)

AD-417 369 Div. 8, 14
(TISTM/BRW) OTS price $5.60

Varian Associates, Palo Alto, Calif.
HIGH POWER R-F WINDOW STUDY PROGRAM.
Quarterly technical note no. 4, 1 Apr-30 June 63,
by Floyd Johnson. July 63, 43p. Rept. no. 304 4Q
Contract AF30 602 2844, Proj. 5573, Task 557303
RADC TDR63 349 Unclassified report

Descriptors: (*Waveguide windows, Design), (*Materials, Waveguide windows), Equations, Mathematical analysis, Programming (Computers), Programming language, Sapphires, Aluminum compounds, Beryllium compounds, Oxides, Ceramic materials, Microwave equipment.

The objective of specifying and deriving the elements of an equation for the analytical solution of waveguide window design problems has been met. By programming this equation and using dimension parameters as variables, a computer can be used to greatly speed up window design. Two types of windows have been programmed and successfully computed. The block ceramic window, using dual-symmetric, inductive iris broadbanding techniques, has been computed for several cases and the results have been shown to be almost exact when compared to measured data. The thin disc type of window, either single or double disc dielectric cooled, has also been programmed. Comparisons of computed and measured results also show a very close correlation, but it is not so exact as for the block window. (Author)

AD-417 379 Div. 8, 7, 30
(TISTE/JBM) OTS price $4.60

Westinghouse Electric Corp., Pittsburgh, Pa.
HIGH VOLTAGE SURGE MEASUREMENTS ON STRANDED COPPER CONDUCTOR AND ON MAGNETIC TAPE WRAPPED STRANDED COPPER CONDUCTOR,
by W. E. Pakala and H. M. Smith. 8 Aug 63, 1v.
Research rept. 63 928 565R1
Contract NBY32226
Unclassified report

Descriptors: (*Electric cables, Transients), (*Transients, Electric cables), (*Electric potential, Electric cables), Measurement, Magnetic tape, Attenuational, Tests, Copper, Transmission lines, Lightning, Test equipment (Electronics).

Tests were conducted to determine if a magnetic tape wrapped conductor will attenuate high voltge surges, such as produced by lightning. Tests were made on a high voltage test line. Surge crest voltages on test conductors were from 270 kilovolts up to 900 kilovolts. Surges were applied to a single standard No. 2 seven strand copper conductor line 2617 feet long and surge voltage oscillograms were taken simultaneously at or near the surge generators and near the center of the test line, and at or near the surge generator and at the end of the test line. After these tests were completed the No. 2 copper conductor was removed and replaced with the magnetic tape wrapped No. 2, seven strand copper conductor. It was found that the positive polarity crest surge voltage was reduced at end of test line by the plain copper line from 81 to 88 percent of its sending end value depending on the surge voltage magnitude. With the magnetic tape wrapped conductor the positive polarity crest surge voltage was reduced at end of test line from 70 to 73 percent of its sending end value depending on the magnitude of the surge voltage. Negative polarity surges were reduced to a lesser extent. These results indicate that the overall attenuation constant is approximately two times as great, at high surge voltages, for the magnetic tape wrapped conductor as it is for the plain copper conductor. (Author)

AD-417 409 Div. 8, 25
(TISTE/JBM) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THERMOELECTRIC SEMICONDUCTOR COOLING DEVICES.
1 Aug 63, 10p.
FTD TT63 692 Unclassified report

Trans. from Maschpriborintorg, USSR, Moskva, pp. 3-11.

Descriptors: (*Thermoelectricity, Cooling), (*Semiconductors, Thermoelectricity), (*Cooling, Thermoelectricity).

AD-417 454 Div. 8, 12
(TISTE/JBM) OTS price $1.60

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
ANTENNA WINDOW: A TECHNIQUE FOR PROPAGATION THROUGH A PLASMA SHEATH.
Interim engineering rept. no. 9, 15 June-15 Sep 63,
by Robert G. DeLosh. 15 Sep 63, 13p. Rept. no. BSC40123
Contract AF33 616 8420
Unclassified report

Descriptors: (*Reentry vehicles, Propagation), (*Propagation, Plasma sheath), (*Antennas, Reentry vehicles), (*Waveguide windows, Antenna components), Liquid cooled, Test methods, Heat transfer, Solenoids, S-band Liquefied gases, Cryogenics, Helium, Pulse transmitters, Niobium, Zirconium.

Efforts were continued on the development of the antenna window technique for propagation through a plasma sheath for reentry vehicles. The design of an outer reservoir for the antenna window Dewar is discussed. This will be filled with a fluid and cooled to 77 K to reduce heat transfer into the solenoid. A test for determining a suitable fluid for use in the outer reservoir is described. Certain modifications of the Dewar structure, a switch for connecting and disconnecting the current leads from the solenoid, and an S-band transmitter are discussed. (Author)

AD-417 455 Div. 8
(TISTE/OHD) OTS price $8.60

Microwave Associates Inc., Burlington, Mass.
ULTRA HIGH POWER TRANSMISSION LINE TECHNIQUES.
Final technical note,
by Meyer Gilden, Richard Madore and Joseph Pergola. 18 Mar 63, 1v.
Contract AF30 602 2545
RADC TDR63 167 Unclassified report

Descriptors: (*Transmission lines, Radiofrequency power), (*Waveguides, Malfunctions), Waveguide filters, Bandwidth, Cooling, Attenuation, Electric discharges, Design, Theory, Reliability (Electronics), Gases, Electric fields.

The ultra-high power transmission line techniques including both failure mechanisms and component design are discussed. Failures resulting from localized regions of heated gas were studied and a more general equation for breakdown was derived to show the effect of the size of the region. Similarly small obstacles produce regions of high field strength; but the presence of these very small regions become evident only at high pressures or with high dielectric strength gases. Among the other subjects reviewed from earlier reports is the experimental study of the factors effecting arc movement in a waveguide. In view of the many advantages of the low loss mode in circular waveguide for ultra-high power levels, a mode transducer and a two section mode filter or suppressor were designed and constructed. The short compact transducer has a bandwidth more than 8 percent and it can handle 25 percent of the peak power of a standard rectangular waveguide. Water cooling is provided for high average power operation. Analysis of mode suppression as related to failure of waveguide systems indicates that an equivalent one way attenuation of 5 db is a practical value of attenuation for a mode suppressor where high average power levels are involved. Where only high peak powers are involved lower levels of attenuation are sufficient. (Author)

AD-417 460 Div. 8, 26
(TISTE/JBM) OTS price $1.60

Bliley Electric Co., Erie, Pa.
PRODUCTION ENGINEERING MEASURE. CR-(XM-45)/U QUARTZ CRYSTAL UNITS.
Quarterly progress rept. no. 4, 1 Mar-31 May 63. 31 May 63, 22p.
Contract DA36 039sc86719
Unclassified report

Descriptors: (*Quartz resonators, Production), (*Production, Quartz resonators), Low frequency, Standards, Stability, Vibration, Temperature, Specifications.

Efforts were continued on the establishment of a PEM on the CR-(XM-45)/U quartz crystal units. The crystal units are in the 90 kc to 200 kc frequency range. They are similar to the GR-42A/U units except that they must withstand much more severe vibration and they must hold much tighter frequency stability over the +70 C to +80 C operating temperature range. The various experimental designs which were derived and evaluated are reviewed. The strengths and the weaknesses are discussed of each of the experimental designs and it is shown that the GR-(XM-45)/U requirements are mutually prohibitive. (Author)

AD-417 499 Div. 8, 25
(TISTP/FEM) OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
RADIO PHYSICS.
Quarterly progress rept., 1 Apr-31 July 63.
30 Aug 63, 14p.
Contract AF19 628 500
ESD TDR63 109 Unclassified report

Descriptors: (*Tracking, Satellites (Artificial)), (*Radar tracking, L band), (*Ionospheric propagation, Scattering), (*Plasma physics, Shock waves), Parabolic antennas, Gain, Parametric amplifiers, Digital systems, Radiometers, Calibration, Antennas, Instrumentation, Radio astronomy, Radar, Propagation, Plasma medium, Ionization, Electron density, Probes (Electromagnetic), Bibliographies, Atmosphere entry.

AD-417 500 Div. 8, 25
(TISTP/FEM) OTS price $3.60

International Business Machines Corp., Poughkeepsie, N. Y.
USE OF OPTICAL MASERS IN DISPLAYS AND PRINTERS.
Quarterly rept. no. 2, 7 Apr-6 July 63,
by H. Fleisher and W. Kulcke. 10 Sep 63, 35p.
Contract DA36 039AMC00118
Unclassified report

Descriptors: (*Lasers, Display systems), (*Light, Amplitude modulation), Focusing, Beams (Electromagnetic), Models (Simulation), Digital systems, Optical images, Deflection, Input-output devices, Electrodes, Modulators, Optical equipment, Mechanical drawings, Circuits, Electronic switches, Crystals, Refraction, Manufacturing methods.

High-speed deflection of light beams by digital and analog techniques were investigated. For the digital light deflector, power consumption was determined semitransparent electrodes were valuated, and a bread-board model was constructed. Analog deflection using conical refraction was temporarily suspended due to lack of crystals. The work on Fresnel lenses progressed with respect to the fabrication of photo-etched electrodes. (Author)

AD-417 532 Div. 8, 25, 14
(TISTP/FEM) OTS price $2.75

Harry Diamond Labs., Washington, D. C.
ELECTRETS. PART II. A BIBLIOGRAPHY,
by Virginia Ann Johnson. 30 Sep 62, 128p.
DA Proj. 5B97 01 005 and HDL Proj. 30331
HDL TR1074 Unclassified report

Descriptors: (*Electrets, Bibliographies), (*Bibliographies, Electrets), (*Dielectrics, Polarization), Dielectric properties, Photoelectric effect, Materials, Waxes, Polymers, Electric fields, Liquids, Solids, Physical properties.

A bibliography containing over 300 abstracted references and an author index is presented. The references cover the technical literature on electrets: thermoelectrets, photoelectrets, and radioelectrets; and are arranged under these categories. (Author)

AD-417 549 Div. 8
(TISTE/OHD) OTS price $2.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
CALCULATIONS FOR THE CALIBRATION OF NAVY RIFI METERS USING A VERTICAL ROD ANTENNA,
by R. D. Hitchcock. 6 Sep 63, 22p.
NCEL Rept. no. TN534 Unclassified report

Descriptors: (*Measuring devices (Electrical & electronic), Radio interference), (*Radio fields, Measurement), (*Calibration, Test equipment (Electronics)), Mathematical analysis, Antennas, Sea water, Very low frequency, Low frequency, Medium frequency, High frequency, Very high frequency.

From curves of vertical electric fields and disturbance errors versus distance, it is shown how calibration factors for an RIFI meter can be obtained by taking measurements at the surface of a conducting body of briny water such as the Great Salt Lake, Utah. Curves are presented which show that, for the four frequencies, 10 kc/sec, 100 kc/sec, 1 mc/sec, and 10 mc/sec, the vertical electric field produced by a vertical 1-meter antenna is, at any given distance up to 200 meters, the same for all values of conductivity, greater than or equal to 5 mhos/meter. Thus, a brine solution with a conductivity in this range is equivalent to a perfectly conducting earth. At a frequency of 75 mc/sec the field values are the same at distances up to about 100 meters for all values of conductivity equal to or greater than 5 mhos/meter. Curves are also given which show the dependence of the disturbance error on distance, as produced by a receiving vertical 1-meter antenna. (Author)

AD-417 553 Div. 8, 5
(TISTE/JWS) OTS price $1.60

Smyth Research Associates, San Diego, Calif.
A STUDY OF PROPAGATION MEDIUM RF NOISE.
Interim engineering rept. no. 1.
Sep 63, 12p. Rept. no. SRA360
Contract AF33 657 1161
Unclassified repor

Descriptors: (*Radiofrequency interference, Antenna configurations), (*Antenna configurations, Radiofrequency interference), Propagation, Partial differential equations, Gain, Scattering, Mathematical prediction, Angle of arrival, Distortion, Atmospheric.

This investigation of Propagation Medium RF Noise, has as its two primary objectives the determination of the character and magnitude of the noise introduced into radio communications systems by the propagating medium, and the development of techniques for reducing this noise by proper optimum antenna design. The study has been divided into four phases. In

the first phase, the concet of the antenna as a ''space frequency filter'' was crystallized and some sample systems were studied in sufficient detail to define which characteristics of the noise are important from an antenna optimization standpoint. In the second phase, now under way, the available refractive index and radio propagation data are being studied in order to determine the required noise characteristics. In phase three, the mathematical and conceptual tools for using this data in designing optimum antennas for specific purposes will be further developed. Phase four will consist of the application of the results of the first three phases to the problems of specifying optimum antennas for various applications such as interference reduction, error reduction in high data rate systems, maximizing detection ranges, etc. If the results of phase two indicate that there is insufficient information about the noise available, definitive experiments to gather the required data will be proposed. (Author)

AD-417 556 Div. 8, 25
(TISTP/FEM) OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
MICROWAVE REFLECTION FROM SHOCK-PRODUCED PLASMAS,
by G. W. Bethke and A. D. Ruess. Sep 63, 49p.
Rept. no. R63SD77
Contract AF30 602 1968
Unclassified report

Descriptors: (*Electromagnetic wave reflections, Microwave frequency), (*Plasma mediums, Microwaves), X band, Plasma sheath, Shock waves, Sources, Krypton, Xenon, Electron density, Temperature, Measurement, Theory, Communication systems, Hypersonic planes, Probes (Electromagnetic), Shock tubes.

Reflection measurements have been made of very-low-power, X-band microwaves axially incident on shock-produced xenon and krypton plasmas. The electron density profile at the advancing shock front was measured with a special high resolution transverse 60 kmc interferometric probe. On comparison with free space exponential plasma-microwave interaction theory, the measured reflection coefficients were always found to be very significantly lower than the theoretical values, the greatest disagreement being at the lowest plasma densities. It is concluded that the theoretical development of non-uniform plasma-microwave interactions within a conducting wall non-resonant container, would permit a better comparison of theory with experiment. It also appears that more may have to be known about shock front (electron ramp) electron temperatures and electron collision frequencies before exact comparisons between theory and experiment are possible. (Author)

AD-417 566 Div. 8
(TISTP/MH) OTS price $11.00

Smyth Research Associates, San Diego, Calif.
METHOD OF LOCATING ATMOSPHERIC-SCATTER AND OBSTACLE-GAIN SIGNAL SOURCES.
Final rept.
Apr 61, 112p. Rept. no. 4; SRA192
Contract DA36 039sc80557
Unclassified report

Descriptors: (*Detection, Radio signals), (*Radio signals, Detection), Scattering, Atmosphere, Troposphere, Measurement, Electromagnetic waves, Reflection, Refraction, Diffusion, Propagation, Sources, Ionospheric propagation.

Investigation of the possibilities existing within the present state of the art for determining the location of equipments designed to operate on atmospheric-scatter including tropospheric scatter, and obstacle-gain principles from measurements of the radio signals made at points beyond the line of sight such that the radiated electromagnetic signals from the equipment have suffered reflection, diffusion, scatter and refraction by the propagation media. (Author)

AD-417 575 Div. 8
(TISTP/FEM) OTS price $2.60

Microwave Associates, Inc., Burlington, Mass.
KA-BAND CRYSTAL PROTECTOR.
Quarterly progress rept. no. 1, 15 Mar-15 June 63,
by Paul Basken. 15 June 63, 27p. Rept. no. 1
Contract DA36 039AMC00157, Task 1G6 22001A055 04
Unclassified report

Descriptors: (*Crystals, K band), (*Transmit-receive tubes, Gas ionization), Design, Reliability (Electronics), Crystal mixers, Diodes, Gases, Microwave equipment, Plasma medium, Varactor diodes, Bandwidth, Waveguides, Waveguide windows, Extremely high frequency, Radar duplexers.

A plan was established to investigate three design approaches and to select the best one for the final units of a K band crystal protector. A preliminary life test was started on a gas tube at 10 kw to pinpoint possible problem areas. Some low level design work on windows, resonant elements, and limiter configurations has been accomplished. (Author)

AD-417 616 Div. 8, 25
(TISTP/WH) OTS price $9.60

Cruft Lab. Harvard U., Cambridge, Mass.
A STUDY OF CIRCULAR ARRAYS. -2-. SELF AND MUTUAL ADMITTANCES,
by Richard B. Mack. 1 May 63, 1v. Technical rept. no. 382
Contract Nonr1866 32, Proj. NR371 016
Unclassified report .

Descriptors: (*Electrical properties, Measurement), (*Dipole antennas, Electrical properties), Admittance, Coaxial cables, Numerical methods and procedures.

AD-417 617 Div. 8, 25
(TISTP/WH) OTS price $5.60

Cruft Lab., Harvard U., Cambridge, Mass.
A STUDY OF CIRCULAR ARRAYS. -1-. EXPERIMENTAL EQUIPMENT,
by Richard B. Mack. 1 May 63, 1v. Technical rept. no. 381
Contract Nonr1866 32, Proj. NR371 016
Unclassified report

Descriptors: (*Antennas, Electrical properties), (*Antenna radiation patterns, Measurement), (*Probes (Electromagnetic), Antennas), Reflectors, Electrical impedance, Ultrahigh frequency, Slot antennas.

Construction details are given for experimental equipment designed to permit measurement of the self and mutual admittances, current distributions along the radiating elements, and far field radiation patterns of small antenna arrays. The antennas are formed by extending the longi-

tudinally slotted inner conductor of a rigid coaxial line beyond a large groundplane while terminating the outer conductor on the groundplane. A small balanced loop probe can be moved along the slot to sample the tangential magnetic field near the conductor. Measurement errors due to the probe are discussed. The array under test can be rotated by means of a turntable which is described. Radiation patterns are measured by transmitting with the array under test and receiving with a corner reflector antenna mounted on the groundplane but in the far field of the array. Although designed for 663 Mcps the equipment will operate over a wide range of frequencies. (Author)

AD-417 620 Div. 8
(TISTE/CAM) OTS price $5.60

Electronics Research Lab., U. of Calif., Berkeley.
ANODE STRUCTURES FOR COLD-CATHODE HIGH-POWER MAGNETRON,
by Y. Ikeda. 30 June 62, 43p. Series no. 60, Issue no. 455; Scientific rept. no. 20
Contract AF19 628 324, Proj. 5634, Task 563402
AFCRL 63 320 Unclassified report

Descriptors: (*Magnetrons, Cold cathode tubes), (*Anodes (Electron tubes), Magnetrons), Power, Configuration, Cavity resonators, Circuits, Electron beams, Coupling circuits, Measurement, Theory, Analysis.

Rf in eraction properties of several structures suitable for cold-cathode high-power magnetrons have been investigated analytically and experimentally, with special emphasis on increasing the understanding of the interaction and maximizing the area of coherent interaction with the electron beam at a given frequency. The structures analyzed were designed for large mode separation, maximum interaction impedance, and easy coupling to the outpu circuit. (Author)

AD-417 624 Div. 8
(TISTE/JWS) OTS price $3.60

General Electric Co., Syracuse, N. Y.
PRODUCTION ENGINEERING MEASURE FOR THE MANUFACTURE OF DEFLECTRON DEVICES.
Quarterly progress rept. no. 4, 14 Feb-14 May 63,
by W. J. Noroski, Jr. 14 May 63, 31p.
Contract DA36 039sc86731
Unclassified report

Descriptors: (*Cathode ray tubes, Manufacturing methods), (*Electron tube heaters, Cathode ray tubes), Ceramic materials, Vapor plating, Vacuum apparatus, Nickel alloys, Tungsten, Aluminum, Electrode holders.

A vacuum-metallization technique for the manufacture of the Deflectron device has been devised. Fixture design and filament configuration have been developed and installed. Ceramic substrate parts and related materials are being procured for the pre-production runs for the CY1.1-33 degree. The facility is being made ready. (Author)

AD-417 643 Div. 8, 6, 2
(TISTP/MFA) OTS price $6.60

Aerospace Research, Inc., Boston, Mass.
TESTING OF IONOSPHERIC ABSORPTION MEASUREMENT EQUIPMENT AND STUDY OF IMPROVED TECHNIQUES FOR DATA COLLECTION.
Rept. for 1 Feb 62-31 Jan 63,
by James B. Edson and Samuel C. Goldman. Apr 63, 57p. Pub. no. 150
Contract AF19 628 359, Proj. MIPR520 62
AFCRL 63 177 Unclassified report

Descriptors: (*Ionospheric propagation, Recording systems), (*Absorption, Measurement), (*Electronic equipment, Tests), Calibration, Diodes, Analog-to-digital converters, Dipole antennas, Networks, Circuits, Feasibility studies, Impedance matching, Diurnal variations, Admittance.

A transistorized Riometer Mark II absorption measuring equipment was tested at the Central Radio Propagation Laboratory, National Bureau of Standards, Boulder, Colorado, with entirely satisfactory results. Studies were conducted and techniques developed to provide automatic calibration and digital output capability to the Riometer Mark II. A prototype automatic calibrator was built and satisfactorily operated. The requirements and techniques of digital data conversion and recording were investigated, and a suitable system is described. A study was made of antenna systems suitable for use in absorption measurements with riometers. A number of antennas were fabricated and tested. The results are discussed, and the type of antenna which has proven most useful is described. (Author)

AD-417 685 Div. 8, 6
(TISTE/JWS) OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
RADIO FREQUENCY INTERFERENCE FROM HIGH POWER EMITTERS TO COMMERCIAL AND ENTERTAINMENT EQUIPMENT,
by Richard E. Rabe, George A. Long, and Hildred R. Butters. Aug 63, 22p.
Proj. 4540, Task 454003
RADC TDR63 287 Unclassified report

Descriptors: (*Radiofrequency interference, Radar), (*Radar transmitters, Radio frequency interference), (*Television receivers, Radio frequency interference), Television receivers, Audio amplifiers, Very high frequency, Ultra-high frequency, Suppressors, Intermediate frequency amplifiers, Filters (Electromagnetic wave), Radiofrequency power.

New Air Force radars operating in the VHF and UHF ranges have compounded the problem of electromagnetic compatibility. Radio frequency interference to civilian and military electronics equipment is enormous. Methods of suppression of this interference, using the susceptibility of TV and hi-fi sets as typical examples of equipment to r-f energy, are discussed. (Author)

AD-417 697 Div. 8
(TISTE/OHD) OTS price $7.60

Pioneer Central Div., Bendix Corp., Davenport, Iowa.
RESEARCH WORK FOR FREQUENCY TEMPERATURE COMPENSATION TECHNIQUES FOR QUARTZ CRYSTAL OSCILLATORS.
Quarterly rept. no. 3, 1 Jan-31 Mar 63.
1 Aug 63, 1v. Pub. no. 2715 63
Contract DA36 039sc90782
Unclassified report

Descriptors: (*Quartz resonators, Temperature), (*Temperature control, Corrections), (*Crystal oscillators, Varactor diodes), Variable capacitors, Thermistors, Capacitance, Stability, Aging (Materials).

This report covers two types of temperature compensation of crystal oscillators, the 'varicap method' and the 'capacitor-diode method.' Various approaches to using varicaps in different compensation schemes were investigated. One of the objects of investigating various compensation circuits is to find different compensation voltage versus temperature characteristics to determine if there is an optimum voltage versus temperature characteristic that can be obtained. A graphical approach to compensation using the capacitor-diode method is discussed. Curves of the predicted and actual curves of delta/f versus temperature are included to illustrate the accuracy of the graphical approach to compensation. The thermistor-resistor networks required for compensation are discussed along with the thermal transient problem. Aging data on temperature compensated crystal oscillators is also shown. (Author)

AD-417 703 Div. 8
(TISTE/CAM) OTS price $3.60

Micro State Electronics Corp., Murray Hill, N. J.
LOW NOISE TUNNEL DIODE MIXERS AND CONVERTERS.
Technical note no. 2, 31 May-30 Sep 62,
by Raoul Pettai and Stuart Becker. 1 May 63, 36p.
Contract AF30 602 2631, Proj. 5573, Task 557301
RADC TDR63 325 Unclassified report

Descriptors: (*Tunnel diodes, Frequency converters), (*Crystal mixers, Tunnel diodes), Theory, Analysis, Noise (Radio), Reduction, Frequency stabilizers, Gain, Sensitivity, Ultra high frequency, X-band, Gallium compounds, Antimony compounds, Processing.

The theoretical analysis of the tunnel diode converter has been extended, giving special attention to stability and non-sinusoidal local oscillator voltage wave shape. A criterion for stability has been defined utilizing the concept of sensitivity of gain. The sensitivity function is then applied to the input (RF) and the output (IF) circuits of the converter to analyze the effects of mismatched source and load on the performance of the converter. The effect of non-sinusoidal local oscillator is considered. Two analytical methods for calculating the modified conductance coefficients of the converter for the non-sinusoidal case are outlined in detail. Experimental models of the UHF tunnel diode converter built in microstrip are discussed and a number of measured results are presented. The experimental effort on the X-Band tunnel diode converter has begun. A new circuit utilizing coaxial components is being designed. Design principles of special tunnel diodes for the X-Band converter are outlined. Refinements in fabrication techniques have led to improved gallium antimonide units, featuring extremely low (0.1nH) lead inductances and high (>25Gc) cutoff frequencies. (Author)

AD-417 706 Div. 8, 26
(TISTE/JBM) OTS price $7.60

Pacific Semiconductors, Inc., Lawndale, Calif.
PRODUCTION ENGINEERING MEASURE. TRANSISTOR, VHF, SILICON, POWER (75W).
Quarterly rept. no. 3, 1 Jan-31 Mar 63,
by R. N. Clarke, R. C. Neville, and J. W. Ewins.
31 Mar 63, 76p. PSI Rept. no. 3000 4703
Contract DA36 039sc86733
Unclassified report

Descriptors: (*Transistors, Production), (*Production, Transistors), Very high frequency, Silicon, Power, Processing, Electrical properties, Manufacturing methods.

Efforts were continued on the establishment of a production engineering measure for VHF silicon power transistors. A summary is given of current processes which indicates that the majority of present effort is an attempt to maintain tight line surveillance and so increase device reliability and line yield. A study was made of the device in order to determine design and process weaknesses. It is shown that device performance falls short of requirements in power dissipation capability and is adequate in power gain and delivered power. (Author)

AD-417 720 Div. 8
(TISTE/OHD) OTS price $8.10

Bureau of Naval Weapons, Navy Dept.,
Washington, D. C.
HANDBOOK PREFERRED CIRCUITS NAVY AERONAUTICAL ELECTRONIC EQUIPMENT. VOLUME II. SEMICONDUCTOR DEVICE CIRCUITS.
1 Apr 63, 1v.
NAVWEPS 16 1 519 2, Supplement no. 1
Unclassified report

Descriptors: (*Semiconductor devices, Circuits), (*Transistor amplifiers, Handbooks), Design, Electronic equipment, Voltage regulators, Power supplies, Gates (Circuits), Relaxation oscillators, Electronic relays, Video amplifiers, Amplifiers, Intermediate frequency amplifiers, Crystal oscillators, Radio frequency amplifiers.

The purpose of the Preferred Circuits Handbook is to document proven electronic circuits and to encourage their use in the design of Naval airborne electronic equipment. Present day technological advances have made it possible to produce versatile, reliable, miniaturized electronic equipment to a degree not thought possible a few years ago. Use of Preferred Circuits Handbook is a contribution to this end. Furthermore, savings can be realized in more efficient use of engineering manpower, more rapid analysis of circuit failures, fewer educational programs, shorter research and development time and lower inventories without any sacrifice of good design practices. The ultimate success of the preferred circuits program depends upon the active participation of the design and equipment manufacturer in utilizing the circuits, in criticising the material presently in the Handbook, and in submitting improved or additional circuits for inclusion in the Handbook. (Author)

AD-417 752 Div. 8, 24
(TISTA/VGW) OTS price $1.60

RCA Industrial Tube Products, Lancaster, Pa.
APPLIED RESEARCH ON HIGH RESOLUTION CAMERA TUBES.
Interim technical documentary rept. no. 4, 1 Apr-31 Aug 63,
by P. Herold, A. A. Rotow, and O. H. Schade, Sr.
17 Sep 63, 18p. BPSN Rept. no. 2 670 4156 41653
Contract AF33 657 7939
Unclassified report

Descriptors: (*Camera tubes, Design), Cathode ray tube screens, Electron guns, Electron beams, Electrodes, Electron tube parts, Electron multipliers, Cathodes (Electron tubes), Resolution, Television cameras.

Continued research is reported on positive-grid electron guns. The new effort is concerned with

cathode, electron gun and electron beam problems; and with the development of a system for cycled operation of a camera tube of the image orthicon type. It is also a continuation of work in developing a target structure consistent with the requirements for a high sensitivity camera tube capable of 1500 television lines per inch at 50 percent sine-wave response over a 2 x 2 in. format. The handling procedures for processing targets was further developed and refined. Work in this area is continuing. Special testing equipment was built and assembled in order to test and evaluate the tubes being built under this contract. (Author)

AD-417 754 Div. 8
(TISTE/JWS) OTS price $3.60

Motorola Inc., Chicago, Ill
DATA TRANSMISSION INVESTIGATION.
Quarterly progress rept. no. 3, 11 Mar 63-10 June 63,
by R. F. Salava. 10 June 63, 38p. Rept. no. 7
Contract DA36 039sc90728, Proj. 3B31 07 001
Unclassified report

Continuation of Contract DA36 039sc90728

Descriptors: (*Data transmission systems, Radio communication systems), (*Radio communication systems, Data transmission systems), Coding, Errors, Frequency shift keyers, Tests, Modulators, Demodulators, Radiofrequency interference, Digital systems, Modulation.

Field test results of various modems operating over the AN/VRC-12 radio set are presented. Map profiles of each data link are shown and the average error rates are given for digital data transmission at rates from 300 to 4800 bps. Bit error rates vary depending upon the site and bit rate. The errors are analyzed for multiple error characteristics and the probability of receiving a message error free as a function of message length. Photographs of the frequency spectra generated by each modem at their various bit rates are presented and used to discuss the relative bandwidth requirements of the modems. The performance of the FSK (AN/TYC-1,XC-2), Di-Phase and Quad-phase modems in the presence of a controlled impulse moise test while operating at 1200 bps is shown in graphical form. A multi-frequency modem is being constructed for the HF data transmission study phase of the contract. The modem will have the capability of 18 bit rates and will be used in the investigation of the short range HF data transmission. System block diagrams of the multi-frequency modem are presented, and the performance of the clock generator and clock recovery circuits is discussed. The limits of the code's error correcting and detecting capability are shown, and the code's performance when these capabilities are exceeded is discussed. (Author)

AD-417 755 Div. 8
(TISTE/AM) OTS price $2.60

Radio Corp. of America, Harrison, N. J.
THERMOELECTRIC POWER MODULES.
Quarterly progress rept. no. 2, 15 Apr-15 July 63,
by Hans P. Van Heyst. 15 July 63, 23p.
Contract DA36 039amc00110E, Proj. 1G6 22001A053 03
Unclassified report

Descriptors: (*Thermoelectricity, Generators), (*Modules (Electronic), Thermoelectricity), Tests, Performance (Engineering), Tables, Heat transfer, Aluminum, Weight, Semiconductors, Silicon, Germanium, Data, Electrical properties, Measurements, Electric potential, Resistance (Electrical), Power, Temperature, Time.

During this reporting period the four thermoelectric power modules which were put on life test completed 2000 hours of unattended operation. A hot junction temperature of 800 C was maintained. During this time period satisfactory performance of the modules was observed and the test is continuing. Two additional modules were started on a cycled life test, one hour on and one and one half hours off for an eight hour period, and continuous operation for the remainder of the 24 hour period. These modules completed satisfactorily 80 cycles and 780 hours of operating time at a hot junction temperature of 850 C and the test is continuing. (Author)

AD-417 757 Div. 8
(TISTW/HSS) OTS price $9.10

Rome Air Development Center, Griffiss Air Force Base, N. Y.
NETWORK SYNTHESIS WITH MULTIWIRE LINES,
by A. Matsumoto. Aug 63, 98p.
Proj. 8505
RADC TDR63 369 Unclassified report

Descriptors: (*Electrical networks, Synthesis), Transmission lines, Wave transmission, Propagation, Synthesis, Networks, Theory, Matrix algebra, Mathematical analysis, Linear systems.

This is a monograph containing six papers on the synthesis of linear networks with multiple wire transmission lines. Paper 1 discusses propagation along multiwire lines with emphasis upon the lossless case. Paper 2 investigates fundamental properties of multiwire networks in terms of open and short circuit terminations at one end. Pole properties of impedance and admittance matrices are obtained. Paper 3 shows how line constants can be calculated from line dimensions. Paper 4 treats 2-wire line synthesis of Darlington C and Brune sections. Papers 5 and 6 treat distributed equivalents of Darlington Type C and Brune sections respectively. (Author)

AD-417 791 Div. 8
(TISTE/OHD) OTS price $3.60

Stanford Research Inst., Menlo Park, Calif.
DESIGN AND CONSTRUCTION OF 150-FOOT STEERABLE PARABOLIC ANTENNAS.
Final rept.,
by John C. Schlobohm and George K. Durfey.
May 63, 33p.
Contract AF19 604 5912, Proj. 8653, Task 00001
AFCRL 63 677 Unclassified report

Descriptors: (*Parabolic antennas, Scientific research), Supports, Structural parts, Design, Tests, Radio astronomy.

This report provides a brief description of the two completely steerable 150-foot-diameter parabolic antennas constructed by Stanford Research Institute at Stanford, California and Hamilton, Massachusetts. The antennas are to be used for radio and radar astronomy and will be operated in conjunction with other equipment yet to be installed. A list of drawings used in construction of the antennas is included for reference. Results of measurements of dynamic testing of the antenna located at Stanford are also presented. (Author)

9. FLUID MECHANICS

AD-417 156 Div. 9
(TISTP/WH) OTS price $4.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
REAL GAS FLOW FIELD PROPERTIES AROUND BLUNT CONES VOLUME I,
by B. Z. Jenkins. 19 Aug 63, 36p. Rept. no. RF TR63 18
Unclassified report

Descriptors: (*Blunt bodies, Hypersonic flow), (*Hypersonic flow, Blunt bodies), Angle of attack, Thermodynamics, Three-dimensional flow.

A compilation of real gas, angle of attack, flow field data for spherically blunted cones is presented in two volumes. Volume I contains the general discussion of flow fields and representative data. Volume II contains detailed tabulations of flow field data. Spherically blunted cones at reentry altitudes and Mach numbers were determined from the General Applied Sciences Laboratory (GASL) Three Dimensional Flow Field Program. (Author)

AD-417 182 Div. 9, 1
(TISTA/FRL) OTS price $1.00

Systems Technology, Inc., Inglewood, Calif.
TOPICS ON FLEXIBLE AIRPLANE DYNAMICS. PART I. RESIDUAL STIFFNESS EFFECTS IN TRUNCATED MODAL ANALYSIS,
by B. F. Pearce. July 63, 26p.
Contract AF33 657 8374, Proj. 8219, Task 821901
ASD TDR63 334, Pt. 1 Unclassified report

Descriptors: (*Airframes, Aeroelasticity), Jet planes, Aerodynamic characteristics, Stability, Aerodynamic loading, Equations, Motion, Dynamics, Elasticity.

The flexible airframe equations of motion are derived with an arbitrary number of elastic degrees of freedom included. The number of equations is reduced to include only those necessary for adequate dynamic representation of the airframe, and the effects of the excluded modes are shown. The result is that a matrix X sub infinity must be calculated which is a function of the flexibility represented by the excluded modes. The calculation of this matrix is complicated by the fact that it is, in explicit form, a function of the mode shapes for the excluded elastic degrees of freedom. Usually only a few of these higher order mode shapes can be found with any accuracy. The problem is resolved by identifying two quantities, X sub f and X sub f + infinity, which are superposable to give the complete effects of structural static deflections, X sub infinity. This physically satisfying result is implemented by relating X sub f + infinity and X sub f to basic geometrical, inertial, and stiffness properties. The solution is completely general and applies to all elastic systems. (Author)

AD-417 224 Div. 9
(TISTE/JBM) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
THE N. O. L. 10,000 ATM. BALLISTIC PISTON COMPRESSOR. I. DESIGN AND CONSTRUCTION,
by George T. Lalos. Sep 63, 16p.
NOL TR63 96 Unclassified report

Descriptors: (*High-pressure compressors, Gases), (*Gases, High-pressure compressors), High pressure research, High-temperature research, Density, Tests, Pistons, Compressor parts.

An apparatus is described which makes possible the rapid and momentary compression of a test gas from atmospheric pressure to a maximum pressure of 10,000 atmospheres. Accompanying temperatures are of the order of magnitude of 10,000 K and depend on the test gas and the initial conditions. This ballistic piston compressor is specifically designed for the study of the nature of the radiation emitted by extremely hot dense gases. Idealized calculations are presented of the relative density, temperature, volume of the hot dense gas sample, and reservoir pressure for the test gas pressure range of one to 10,000 atmospheres. (Author)

AD-417 234 Div. 9, 1, 12
(TISTA/LSK) OTS price $2.00

Systems Technology, Inc., Inglewood, Calif.
TOPICS ON FLEXIBLE AIRPLANE DYNAMICS. PART III. COUPLING OF THE RIGID AND ELASTIC DEGREES OF FREEDOM OF AN AIRFRAME,
by H. R. Pass, B. F. Pearce, and J. Wolkovitch. July 63, 70p.
Contract AF33 657 8374, Proj. 8219, Task 821901
ASD TDR63 334, pt. 3 Unclassified report

Descriptors: (*Airframes, Aeroelasticity), Dynamics, Stability, Detectors, Deformation, Flight control systems, Elasticity, Airplanes, Automatic pilots, Equations, Motion.

The dynamic coupling of rigid and elastic degrees of freedom of an airplane are described by two methods. In the first, coupling is described by the changes in airframe characteristic equation roots caused by the introduction of coupling terms to the equations of motion. The second method employs modal response coefficients to compare the relative amplitudes of rigid and elastic degrees of freedom at each coupled mode frequency. Simple literal expressions are obtained for each of these descriptors and physical interpretations given. Time vector diagrams are also used to show the major parameters affecting coupling. (Author)

AD-417 238 Div. 9, 1, 15
(TISTA/VGW) OTS price $1.50

Systems Technology Inc., Inglewood, Calif.
TOPICS ON FLEXIBLE AIRPLANE DYNAMICS. PART II. THE APPLICATION OF FLEXIBLE AIRFRAME TRANSFER FUNCTION APPROXIMATIONS AND THE SENSITIVITY OF AIRFRAME TRANSFER FUNCTIONS TO ELASTIC MODE SHAPES,
by B. F. Pearce and R. K. Siskind. July 63, 45p.
Contract AF33 657 8374, Proj. 8219, Task 821901
ASD TDR63 334, Pt 2 Unclassified report

Descriptors: (*Jet planes, Airframes), (*Airframes, Aeroelasticity), Mathematical analysis, Deformation, Elasticity, Aerodynamic configuration, Functions, Numerical analysis, Stability, Dynamics.

The generality of the airframe transfer function factor approximation formulas presented in ASD-TDR-279 is tested by applying them to three different aircraft. The equations of motion for the test cases are presented and the exact and approximate factors have been tabulated. The approximation formulas are then utilized to calculate the sensitivity of the flexible airframe transfer function factors to mode shape. The formulas are given in terms of airplane stability

derivatives which in turn are functions of the elastic mode deflections. Then, using the results of ASD-TDR-62-279, the desired sensitivity is readily calculable. Many of the transfer function factors are shown to be relatively insensitive to mode shape, thus allowing effective approximation. A review of the literature pertaining to approximate methods for calculating elastic mode shapes is presented in the form of an annotated bibliography. (Author)

AD-417 244 Div. 9, 1, 12
(TISTA/LSK) OTS price $1.00

Systems Technology, Inc., Inglewood, Calif.
TOPICS ON FLEXIBLE AIRPLANE DYNAMICS. PART IV. COUPLING OF THE RIGID AND ELASTIC DEGREES OF FREEDOM OF AN AIRFRAME - AUTOPILOT SYSTEM.
Rept. for 15 Mar 62-15 Feb 63,
by H. R. Pass and B. F. Pearce. July 63, 24p.
Contract AF33 657 8374, Proj. 8219, Task 821901
ASD TDR63 334, pt. 4 Unclassified report

Descriptors: (*Airframes, Aeroelasticity), Dynamics, Stability, Detectors, Deformation, Flight control systems, Elasticity, Airplanes, Automatic pilots, Equations, Motion.

This report describes the use of the sensitivity techniques of ASD-TDR-62-1014 for locating a single sensor on an elastic airframe-autopilot system. The sensor is located such that closed-loop coupling does not interfere with good closed-loop operation of the airframe. Such coupling can physically be interpreted as the generation of undesired command inputs to the autopilot caused by the detection of elastic motion by the sensor. A reasonable first location for the sensor is decided by engineering judgment and the sensitivity of the closed-loop roots to sensor location is found by employing the aforementioned sensitivity techniques. Prediction of the most desirable sensor location can then be made without many tedious iterations. (Author)

AD-417 254 Div. 9
(TISTP/FEM) OTS price $9.10

United States Rubber Co., Wayne, N. J.
HYDROELASTIC BEHAVIOR. COMPLIANT COATINGS.
by F. W. Boggs and N. Tokita. 19 June 63, 100p.
Contract NOw60 0676c, Proj. 100 61 56
Unclassified report

Descriptors: (*Coatings, Elasticity), (*Fluid flow, Coatings), Drag, Thickness, Reynolds number, Numerical methods and procedures, Water, Boundary layer, Stability, Flutter, Velocity, Surface properties, Water waves, Flat plate models, Pressure, Equations, Integral transforms, Hydrodynamics.

This report describes the interaction of a flexible surface with incompressible flow. It is shown that there are critical speeds above which the surface will be subject to static divergence or flutter. Below these speeds, the flexible surface may delay transition. (Author)

AD-417 255 Div. 9, 15
(TISTP/FEM) OTS price $3.60

Rensselaer Polytechnic Inst., Troy, N. Y.
THE STRUCTURE OF NONLINEAR CELLULAR SOLUTIONS TO THE BOUSSINESQ EQUATIONS.
by Lee A. Segel. 12 Aug 63, 31p.
Unclassified report

Descriptors: (*Stability, Theory), (*Convection, Thermal expansion), Models (Simulations), Equations, Fluids, Nonlinear differential equations, Fluid mechanics, Numerical methods and proceedures.

A model equation is constructed whose analysis reveals the same features, including stable hexagonal cells, as analysis of genuine approximate equations for the thermal convection problem. Taking advantage of the relative simplicity of the calculations an attempt is made to clarify certain procedures customarily used in nonlinear stability theory; in particular, the basis for the usual formal expansions and the appropriateness of neglecting terms of fourth and higher order are discussed. It is demonstrated that a whole class of equations lead to hexagonal cells, thereby giving confidence that results on convection cells found elsewhere in idealized situations will remain valid when more realistic situations are studied. (Author)

AD-417 329 Div. 9, 25
(TISTP/WH) OTS price $2.60

Cornell U., Ithaca, N. Y.
THE HYDROMAGNETICS OF AN ELLIPSOID MOVING IN A CROSS-FIELD
by G. S. S. Ludford and M. P. Singh. July 63, 17p. Technical rept. no. 4
Contract Nonr401 46
Unclassified report

Descriptors: (*Magnetohydrodynamics, Incompressible flow), (*Fluid mechanics, Magnetohydrodynamics), Electric fields, Particles, Ellipsoids, Electrical conductance.

The slow uniform motion (x) of a sphere through an incompressible, inviscid, electrically conducting fluid in the presence of a transverse magnetic field (z) was considered in two previous papers (Ludford and Singh). The ultimate flow pattern is not determined by the steady-state equations which, in general, only predict that it does not change in the direction of the magnetic field. Accordingly, its formation was studied when, for example, the sphere is set impulsively into motion. In this paper we shall show that results similar to those found for a sphere hold for an arbitrary ellipsoid $x2/a2 + y2/b2 + z2/c2 = 1$. (Author)

AD-417 351 Div. 9, 25
(TISTP/HG) OTS price $1.60

Battelle Memorial Inst., Geneva (Switzerland).
CONTRIBUTION OF THREE-BODY INTERACTIONS TO THE ENERGY OF VACANCY FORMATION IN SOLID ARGON,
by L. Jansen. 23 Apr 63, 12p.
Unclassified report

Descriptors: (*Argon, Solid), (*Helium group gases, Solidified gases), (*Crystal structure, Helium group gases), Phase studies, Stability, Specific heat, Measurements, Crystal lattices, Energy, Perturbation theory, Atoms, Molecules, Models, Equations, Numerical analysis, Solid-state physics, Crystallization, N-body problem.

The discrepancy between the calculated value of the free energy of vacancy formation in solid argon and that obtained from an analysis of specific heat measurements, as established recently by Foreman and Lidiard, in interpreted in terms of three-body contributions on the basis of the theory developed by this author and Zimering to explain the absolute stability of the face-centered cubic configurations of

crystals of the heavy rare gas atoms. It is shown that the vacancy-energy deviation from the pair-potential value agrees in sign and magnitude with predictions resulting from the three-body theory. (Author)

AD-417 466 Div. 9, 12
(TISTA/VGW) OTS price $3.60

David Taylor Model Basin, Washington, D. C.
LONGITUDINAL AERODYNAMIC AND HEAT-TRANSFER CHARACTERISTICS OF A HEMISPHERE-CYLINDER MISSILE CONFIGURATION WITH AN AERODYNAMIC SPIKE,
by C. Carl Brindle and Michael J. Malia, Jr. July 63, 30p.
DTMB AR1061 Unclassified report

Descriptors: (*Guided missiles, Wind tunnel models), Spheres, Cylindrical bodies, Blunt bodies, Supersonic characteristics, Spikes, Jets, Supersonic flow, Heat transfer, Lift, Pitch (Motion), Drag, Schlieren photography, Shock waves, Separation, Aerodynamic characteristics.

The results are presented of a wind-tunnel investigation of a hemisphere-cylinder configuration with an aerodynamic spike produced by a small nozzle exhausting air from the center of the hemispherical nose at supersonic speeds. The tests were conducted in the 18-inch supersonic wind tunnel of the Gas Dynamic Facility at test-section Mach numbers of 1.87 and 2.16. The effects of angle of attack and supply pressure upon the longitudinal aerodynamic and heat-transfer characteristics are indicated. (Author)

AD-417 662 Div. 9
(TISTP/MH) OTS price $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
HYPERSONIC INTERACTION AT HIGH ALTITUDES,
by J. A. Laurmann. 1 Sep 63, 1v. Rept. no. 6 90 63 83
Unclassified report

Descriptors: (*Hypersonic flow, High altitude), Atmosphere entry, Viscosity, Fluid flow, Equations, Shock waves, Boundary layer, Surface area, Pressure, Distribution, Theory, Linear systems, Reentry vehicles.

The linearized viscous flow equations are solved in approximate form for hypersonic speeds with slip boundary conditions for the case of a sharp two-dimensional leading edge. The results take into account the shock wave, the outer inviscid and inner viscid boundary-layer flows, as well as the interaction between them. Explicit results are given for the surface pressure distribution and comparison made with experiment. The theory is capable of predicting the various types and regions of validity of interaction phenomena. A future report will provide findings on this topic. (Author)

AD-417 713 Div. 9
(TISTP/FEM) OTS price $12.50

Ordnance Research Lab., Pennsylvania State U., University Park.
REAL FLOW OVER A BODY OF REVOLUTION AT ANGLE OF ATTACK,
by E. J. Rodgers. 28 Mar 63, 16p. Technical memo. 5 24 20 13
Contract NOrd16597
Unclassified report

Descriptors: (*Bodies of revolution, Fluid flow), (*Fluid flow, Angle of attack), Potential theory, Mathematical models, Vortices, Fluid dynamic properties, Slender bodies, Torpedo models, Water tunnels, Experimental data, Pressure, Distribution, Viscosity.

An investigation to determine the difference between the actual flow over a body of revolution and that predicted by potential theory. Since this difference is primarily manifested in terms of vorticity in the flow field about the body, it is desired to determine, (1) how the vorticity is generated along the body, (2) how it is distributed, and (3) what are its most important components. If the axial component of vorticity is the largest component and concentrates into a pair of symmetrical vortices it is also desired to investigate the forward attachment point of the concentrated vortices onto the body. (Author)

AD-417 749 Div. 9, 25
(TISTP/MH) OTS price $5.60

Naval Ordnance Lab., White Oak, Md.
THE EFFECT OF VARIABLE LEWIS NUMBER ON HEAT TRANSFER IN A DISSOCIATING GAS,
by K. R. Enkenhus. Sep 63, 15p.
NOL TR63 145; AR Rept. no. 201
Unclassified report

Descriptors: (*Gases, Heat transfer), (*Heat transfer, Gases), (*Recombination reactions, Heat transfer), Dissociation, Mixtures, Molecules, Atoms, Friction, Fluid flow, Oxygen, Velocity, Temperature, Couette flow, Superaerodynamics, Diffusion, Thermal radiation.

A comparison is made of the variable and constant Lewis number solutions for the Couette flow of a dissociating gas composed of a binary mixture of atoms and molecules. The effect of Lewis number on heat transfer, skin friction and flow properties is determined. Calculations are presented for oxygen for the cases of equilibrium flow and frozen flow with a fully catalytic wall. For both cases, the constant Lewis number Le which gives the same heat transfer rate as the variable Lewis number solution is determined. The results indicate that Le is a simple function of the wall and free stream Lewis numbers. It is only weakly dependent on free stream velocity and temperature. (Author)

10. FUELS AND COMBUSTION

AD-417 341 Div. 10
(TISTM/AMS) OTS price $2.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A SUMMARY OF RECENT COMBUSTION INSTABILITY RESEARCH IN SOLID ROCKET PROPELLANTS AT THE BRL,
by Leland A. Watermeier, Richard C. Strittmater, William P. Aungst, Samuel P. Pfaff, and Clifton E. Thompson. July 63, 34p.
Proj. 1A222901A211
BRL Memo. rept. no. 1489 Unclassified report

Descriptors: (*Combustion, Solid rocket propellants), (*Solid rocket propellants, Combustion), Burning rate, Erosion, Combustion chambers, Gases, Velocity, Test equipment, Test methods, Screaming combustion, Stability.

Division 11 - GROUND TRANSPORTATION EQUIPMENT
Division 12 - GUIDED MISSILES

A summary is presented of progress made in the solid propellant combustion instability program at the Interior Ballistics Laboratory of BRL since the fall of 1962. Recent developments in the acoustic admittance measurements are presented; a description of the apparatus and experimental objectives of a program on acoustic erosivity effects on propellant burning rates are given; and outside contract work on combustion instability which is supervised by BRL is reviewed. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

No Entries

12. GUIDED MISSILES

AD-417 163 Div. 12, 18
(TISTM/AMS) OTS price $7.60

RAND Corp., Santa Monica, Calif.
OPERATIONS AND SUPPORT SCHEDULING METHODS DERIVED FROM LABORATORY PROBLEM II (LP-II) -- A MANNED ICBM SIMULATION,
by A. Sweetland. Nov 61, 69p. Memo. RM2669PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Mobilization), Scheduling, Maintenance, Probabilities, Checkout procedures, Test methods, Operation, Guided missile personnel, Launching sites, Logistics, War potential, Military requirements, Simulation, Malfunctions.

This report describes a number of operational and support techniques. Among the techniques that appear, on the basis of this study, to be useful for actual Air Force missile systems are: (1) opportunistic scheduling -- performing maintenance functions when a missile is down due to critical malfunction; (2) packaging -- combining several scheduled maintenances; (3) eliminating checkout procedure redundancy; (4) utilizing various lesser techniques. Personnel engaged in the simulation found that continuous retargeting improved potential kill, and that physical proximity enhanced coordination among Materiel, Bench Repair, and Dispatch. Tentative assignment of responsibility, with changes made as experience accumulated, seems related to high alert status in missile tactical units. (Author)

AD-417 268 Div. 12
(TISTW/HSS) OTS price $1.60

Hercules Powder Co., Kenvil, N. J.
WING II MINUTEMAN THRUST REVERSAL SYSTEM WEAPON SYSTEM 133A.
Progress rept. 1 Sep 62-28 Feb 63.
6 Sep 63, 17p. Rept no. K35 MR100 3, (Suppl)
Contract AF04 647 243
Unclassified report

Descriptors: (*Retro rockets, Thrust reverse), Exhaust nozzles, Rocket motor nozzles, Rocket igniters, Thrust vector control systems, Transportation, Handling, Mounting brackets.

AD-417 285 Div. 12
(TISTW/AM) OTS price $5.60

Boeing Co., Seattle, Wash.
AIR FORCE PLANT 77 FLIGHT ARTICLE MASS PROPERTIES REPORT FOR WING II MISSILES 738-781,
by R. L. Dramer. 23 Aug 63, 52p.
Contract AF 04 694 46
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Data), (*Weight, Distribution), Reports, Guided missile components.

This document is prepared in accordance with BSD Exhibit 62-110 dated 3 August 1962, 'Missile Assembly Facility Requirements for Mass Properties Data.' It contains the nominal sealant weight and balance summary for Wing II missiles, the weight effect of all changes incorporated at Plant 77 not reported in D2-13946-X, and a configuration page for each missile included in this report. (Author)

AD-417 339 Div. 12
(TISTW/DLW) OTS price $1.60

Boeing Co., Seattle, Wash.
VANDENBERG AIR FORCE BASE FLIGHT ARTICLE MASS PROPERTIES REPORT FOR CTLI MISSILE AF 63-181 (625),
by J. R. Zaverl. 4 Sep 63, 13p. Rept. no. D2 13954 625
Contract AF04 647 757
Unclassified report

Descriptors: (*Guided missile components, Configuration), Weight.

AD-417 378 Div. 12, 6
(TISTA/VGW) OTS price $1.60

Ministry of Posts and Telecommunications (Japan).
RADIO OBSERVATIONS OF USSR SATELLITE SHIPS,
by Yoshiaki Nakata, Miyao Kan, Yasuharu Arima and Kazunori Araki. May 63, 12p.
Contract AF62 531 1235, Proj. 1770
AFCRL Rept. no. 63 489 Unclassified report

Descriptors: (*Satellites (Artificial), Orbital trajectories), (*Manned spacecraft, Orbital trajectories), High frequency, Radio signals, Radio transmission, Doppler effect, Tracking, Analysis.

Analyses are presented of the Doppler frequency shift observed in the beacon signals and voices transmitted from the satellite ships which were launched in the USSR. (Author)

AD-417 410 Div. 12, 32
(TISTA/VGW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEW PHASE IN INVESTIGATING THE COSMOS,
by L. Sedov. 23 July 63, 6p.
FTD TT63 676 Unclassified report

Trans. from Pravda, no. 229, p. 2, August 17, 1962.

Descriptors: (*Astronautics, Space flight), Manned spacecraft, Scientific research, Periodicals.

Recent manned flight results have revealed a

multitude of new possibilities for future scientific investigations. Radio and TV communications between cosmonaut and Earth have been checked and highly valuable experience was obtained for subsequent flights. The action of a number of improved systems has been investigated, systems assuring orientation, flight control and descent to Earth of piloted ships-satellites. Further experiments can now be conducted at an even greater scale and with greater reliability. (Author)

AD-417 521 Div. 12
(TISTA/LSK) OTS price $5.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
A SYSTEM FOR PASSIVE GRAVITY-GRADIENT STABILIZATION OF EARTH SATELLITES,
by Robert E. Fischell and Frederick F. Mobley. Aug 63, 52p. Rept. no. TG514
Contract NOw62 0604
Unclassified report

Descriptors: (*Attitude control systems, Gravity), (*Satellites (Artificial), Stabilization), Satellite attitude, Stabilization systems, Extendable structures, Magnetic fields.

The satellite 1963 22A was successfully captured into a condition of passive, gravity-gradient stabilization. All elements of the stabilization system, including magnetic despin, magnetic orientation devices, the extendible boom, the damping spring, and the attitude detection system performed satisfactorily. An unexpected high frequency oscillation of the boom and satellite system was observed which was most probably a dynamic effect resulting from thermal bending. This has caused the satellite to stabilize with a maximum deviation off the vertical of approximately 10 degrees. The objective of the gravity-gradient stabilization for the 22A satellite was to have the antennas directed downward within 20 degrees of the local vertical at all times. This objective has been successfully accomplished by the satellite's passive, gravity-gradient attitude stabilization system. (Author)

AD-417 698 Div. 12
(TISTW/AAR) OTS price $19.75

Boeing Co., Seattle, Wash.
MINUTEMAN MONTHLY FAILURE SUMMARIES - AUGUST 1963.
13 Sep 63, 1v. Document no. D2 5286 43
Contracts AF04 694 107 and AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Failure (Mechanics)), (*Guided missiles, Reliability), Aircraft equipment, Monitors, Launching, Operation, Data.

AD-417 701 Div. 12
(TISTP/FR) OTS price $1.60

Air Force Proving Ground Command, Eglin Air Force Base, Fla.
PROJECT SPACE TRACK. A METHOD OF PREDICTING SATELLITE DECAY,
by George B. Findley. Apr 61, 15p.
Proj. 1772, Task 17721
ESD TR61 38 Unclassified report

Descriptors: (*Satellites (Artificial), Orbital trajectories), Orbital trajectories, Degradation, Equations.

Equations are derived for predicting the decay day and decay revolution of a satellite. Only two parameters, obtained from the quadratic equation that predicts equatorial crossings, are used. Examples of predictions are given. (Author)

AD-417 760 Div. 12
(TISTB/WA) OTS price $2.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT FOR FTM 446 EQUIPMENT COVERED BY THE FOLLOWING MODEL SPECS: S-133-1000-1-4, STL DOC. 6120-X130=DC002,
by Carl J. Lish. 22 Aug 63, 17p. Rept. no. D2 10889 2, vol. 57
Unclassified report

Descriptors: (*Guided missile components, Acceptability), Safety devices, Arming devices, Detonators, Quality control, Specifications, Visual inspection.

AD-417 761 Div. 12
(TISTW/AAR) OTS price $4.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT FLIGHT TEST MISSILE 446, MODEL SPECIFICATION S-133-1007C,
by Carl J. Lish. 22 Aug 63, 1v. (ept. no. D2 10889 1 vol. 57
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Su9face-to-surface), Acceptability), Aircraft equipment, Specifications, Test equipment, Design, Functional analysis, Flight testing, Failure (Mechanics).

13. INSTALLATIONS AND CONSTRUCTION

AD-417 175 Div. 13, 14
(TISTE/OHD) OTS price $1.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
COOPERATIVE MARINE PILING INVESTIGATION: PHASE 2 -- PILE DRIVING AT PEARL HARBOR, HAWAII,
by H. Hochman. 29 July 63, 16p.
Proj. Y R005 07 007
NCEL TN503 Unclassified report

Descriptors: (*Piers, Creosote), (*Wood, Structural parts), Environmental tests, Sea water, Copper coatings, Copper compounds, Chromates, Ammonium compounds, Mercury compounds, Copper alloys, Nickel alloys, Sheets, Tests.

The Cooperative Marine Piling Committee and the Bureau of Yards and Docks exposed 66 specially treated piles at Pearl Harbor, Hawaii. The treatments being evaluated are chromated copper arsenate followed by creosote, ammoniacal copper arsenate followed by creosote, two concentrations of phenylmercuric oleate in 70/30 creosote-coal tar solution, and 70/30 creosote-coal tar treated piles sheathed with 90/10 cupro-nickel alloy. Unmodified 70/30 creosote-coal tar solution is being used as a comparison standard. In addition, piles treated at NCEL with creosote alone are being used as a secondary standard. This report describes the installation of these piles at Pearl Harbor. (Author)

Division 13 - INSTALLATIONS AND CONSTRUCTION

AD-417 699 Div. 13
(TISTM/BRW) OTS price $19.75

Genistron Inc., Los Angeles, Calif.
PROPOSED SPECIFICATIONS FOR ELECTROMAGNETIC SHIELDING OF ENCLOSURES AND BUILDINGS.
Final rept.,
by L. G. Jakubec, Jr. and H. H. Ohta. 31 July 63, 309p.
Contract NBy32220

Unclassified report

Descriptors: (*Buildings, Electromagnetic shielding), (*Structures, Electromagnetic shielding), (*Electromagnetic shielding, Bibliographies), (*Bibliographies, Electromagnetic shielding), Radiofrequency, Materials, Effectiveness, Costs, Sheets, Metallic textiles, Aluminum, Copper, Iron, Steel, Military facilities, Specifications, Tests, Metal joints.

An investigation was made which was intended to result in definitive specifications and architectural plans for the fabrication and installation of large radio frequency shielded rooms and buildings. The shielding effectiveness of various materials, and fabrication methods for on-site construction from basic materials was determined by literature research and laboratory investigation as required. Methods of electrical bonding between sheets were studied for initial shielding effectiveness and deterioration with aging. The relative merits of butt versus overlapping joints were also determined. The end product is definite drawings and specifications which will provide an optimum shielding effectiveness for such buildings in practice, considering plane wave fields 2 to 10,000 mc, and electromagnetic fields 10 kc to 2 mc. (Author)

14. MATERIALS (NON-METALLIC)

AD-417 108 Div. 14, 17, 20
(TISTM/AMS) OTS price $9.60

General Electric Co., Cincinnati, Ohio.
TWO-GROUP CONSTANTS FOR REACTOR MATERIALS,
by Mary J. Stanley. May 58, 117p. Rept. no. APEX369
Contract AF33 038 21102
Unclassified report

Descriptors: (*Reactor materials, Data), Neutron flux, Integral equations, Programming (Computers), Design, Tables, Temperature, Nuclear properties.

In order to facilitate reactor design studies a compilation of calculated two-group constants averaged over the infinite-medium flux produced by a fission source has been made for approximately 80 materials of interest to reactor engineers. A comparison with available experimental age measurements is included. (Author)

AD-417 133 Div. 14, 26
(TISTM/EJH) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
GRAPHITE CONTAINING REFRACTORY MATERIALS (Grafitosoderzhashchchiye Ogneupory),
by N. A. Golushko. 22 June 63, 135p.
FTD TT63 174 Unclassified report

Trans. from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Literatury Po Chernoy I Tsvetnoy Metallurgii, pp. 1-110, Moskva - 1962.

Descriptors: (*Refractory materials, Production), (*Graphite, Production), (*Production, Refractory materials), (*Crucibles, Production), Manufacturing methods, Molding, Clay, Carbides, Furnaces, Handbooks, Failure (Mechanics), Silicon compounds, Heat treatment.

Production problems of graphite containing refractories having thermal stability are discussed along with raw material properties, preparation, molding, product drying heat treatment, spoilage. Service conditions of refractories and their durability were studied. Designs of intermittent and kiln type furnaces are described in detail. (Author)

AD-417 153 Div. 14, 17
(TISTM/ODN) OTS price $14.50

McDonnell Aircraft Corp., St. Louis, Mo.
EFFECTS OF ANTI-SEIZING COMPOUNDS AND LUBRICANTS ON HIGH TEMPERATURE ALLOYS AT ELEVATED TEMPERATURES.
Final rept.
10 Sep 63, 200p. Rept. no. A078
Contract AF33 657 11215
Unclassified report

Descriptors: (*Heat resistant metals and alloys, Lubricants), (*Lubricants, Heat resistant metals and alloys), (*Antiseize compounds, Heat resistant metals and alloys), Compatibility, Lubrication, Tests, Chromium alloys, Nickel alloys, Cobalt alloys, Iron alloys, Stainless steel, Steel, Test methods, High temperature research, Microstructure, Photomicrography, Corrosion, Inorganic compounds, Experimental data.

At the present time, very little information is available concerning the metallurgical effects of antiseizing compounds and lubricants on high temperature alloys at elevated temperatures. The results of the first phase of the test indicate that none of the compounds tested cause significant change in the microstructure of the alloys, observable at 250X, for temperatures up to 1000F. At 1800F, however, considerable corrosion was present. The type and degree of corrosion varied with the different compounds and alloys. From the results of this test, it could be assumed that any of the compounds tested would be satisfactory for use on these alloys at temperatures to 1000F, but care should be used in selecting an alloy-compound combination for use in the higher temperature range. It should be noted that this report deals only with the metallurgical effects of the compounds tested on metals in the unstressed condition and no reference will be made to the antiseizing, lubricating, or binding capabilities of the compounds. A future series of tests are now being considered for obtaining this information. (Author)

AD-417 167 Div. 14, 20
(TISTM/AMS) OTS price $2.60

General Dyanmics Fort Worth, Tex.
EFFECTS OF REACTOR RADIATION ON CERAMIC-BONDED SOLID-FILM LUBRICANTS,
by F. A. Haley and R. H. McDaniel. 30 Aug 63, 28p. Document no. NARF63 6T; MR N302
Contract AF33 657 7201
Unclassified report

Descriptors: (*Radiation damage, Lubricants), (*Lubricants, Radiation damage), Radiation tolerance, Nuclear reactors, Ceramic materials, Bonding, Films, Solids, Lead compounds, Sulfides, Molybdenum compounds, Boron compounds, Oxides, Graphite, Sodium compounds, Silicates, Wear resistance, Life expectancy, Nickel alloys, Chromium alloys, Iron alloys, Titanium alloys, Niobium alloys, Aluminum alloys, Gamma rays, Dose rates, Tests, Test equipment, Calcium compounds, Fluorides, Experimental data.

Two solid-film lubricant formulations (PbS + MoS2 + B2O3 and MoS2 + graphite + sodium silicate) have been exposed to reactor radiation and tested for wear life on a Hohman A-6 wear tester. Substrate material was Inconel X, rub shoes were of Rex AAA, load per shoe was 110 lb, and sliding speed was 128 ft/min. Several test temperatures up to 1200 F were employed. It was concluded that a gamma dose of 1.47 x 10 to the 11th power ergs/gm(C) and a neutron flux of 2.85 x 10 to the 16th power n/sq cm had no significant effect on the wear life of these films. (Author)

AD-417 214 Div. 14
(TISTM/AMS) OTS price $4.60

Arizona State U., Tempe.
HYPOTHESIS ON THE NATURE OF COHESIVE BONDS IN PORTLAND CEMENT CONCRETE,
by Anthony D. Rynties. July 63, 46p.
Unclassified report

Master's thesis. Original contains color plates; all DDC reporductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Cements, Bonding), (*Concrete, Bonding), Stresses, Failure (Mechanics), Experimental data, Theory, Tests, Gel, Particles, Ions, Analysis, Bonding, Soil mechanics, Mechanical properties.

Failure of concrete specimens, along a plane that is largely composed of aggregate surfaces, indicates that the strength of concrete is limited by the strength and number of gel-aggregate bonds. Aggregate particles exhibit a negative charge, which attracts a cloud of charge-balancing cations to their outer surface. Since the attractive force between two such particles can be increased by a collapsing of these cation clouds, this indicates that an appreciable strength increase can be obtained in this manner. To the best of the author's knowledge, this cation concept is a new and original approach to the explanation of concrete strength. The experiments contained herein cannot, of course, be considered as full and final proof of this hypotheses. However they do give the impression that improvement in concrete strength is a distinct possibility of continued research along this line of reasoning. (Author)

AD-417 219 Div. 14, 17, 1
(TISTM/BRW) OTS price $4.60

McDonnell Aircraft Corp., St. Louis, Mo.
EFFECTS OF TEXO #502AF AND PENNSALT CLEANER #44 PAINT STRIPPERS ON COMMONLY USED AIRCRAFT MATERIALS.
Final rept.
10 Sep 63, 40p. Rept. no. A074
Contract AF33 657 11215
Unclassified report

Descriptors: (*Aircraft finishes, Cleaning compounds), (*Cleaning compounds, Corrosion), (*Paint removers, Corrosion), Steel, Aluminum alloys, Cadmium, Hydrogen embrittlement, Magnesium alloys, Titanium alloys, Salt spray tests, Tensile properties, Failure (Mechanics), Loading (Mechanics).

Epoxy paint used on F4H detail parts is presently being stripped by hand. Because of increased epoxy paint requirements, tank stripping operations are urgently needed to eliminate costly hand stripping. Therefore, it is necessary to determine if the proposed tank type paint strippers have any deleterious effects on materials they will contact. Test panels and tensile strength specimens were immersed in the paint strippers under conditions simulating operating conditions. Panels were checked for weight change, discoloration, and evidence of corrosion. The panels were then placed in the salt spray, in accordance with Method 811.1 of Federal Test Method Standard 151, using a 20% salt solution. (Author)

AD-417 258 Div. 14, 4
(TISTM/EJH) OTS price $1.60

Frick Chemical Lab., Princeton U., N. J.
RELAXATION OF DISULFIDE AND TETRASULFIDE POLYMERS,
by A. V. Tobolsky, W. J. MacKnight and M. Takahashi. Sep 63, 10p. Rept. no. RLT65
Contract Nonr185807, Proj. NR356 377
Unclassified report

Descriptors: (*Organic compounds, Synthetic rubber), (*Synthetic rubber, Relaxation time), (*Polymers, Sulfides), (*Sulfides, Synthetic rubber), (*Relaxation time, Synthetic rubber), Elastomers, Sulfur, Copolymerization, Stresses, Plasticizers, Elasticity, Organic sulfur compounds, Alkenes, Viscosity.

The chemorheology of crosslinked polyethylene disulfide, polyethylene tetrasulfide and mixtures of these polymers with elemental sulfur is investigated. It is shown that stress decay in the disulfide polymer occurs by scission of the small quantities of higher polysulfide linkages present in the network. It is also shown that elemental sulfur decreases the chemical relaxation time in crosslinked polyethylene disulfide in a predictable manner. (Author)

AD-417 365 Div. 14, 8, 25
(TISTM/AMS) OTS price $1.60

Army Engineer Research and Development Labs., Ft. Belvoir, Va.
PREPARATION OF THERMOSTABLE BRIGHT SILVER COATINGS FOR PHOTOELECTRIC CATHODS,
by Yu. V. Golbreich. 19 Mar 58, 16p.
AERDL T 1691 Unclassified report

Trans. from Zhurnal tekhnicheskoy fiziki (J. of Techn. Physics) 8; 13-14, pp. 1229-1234, 1958.

Descriptors: (*Silver, Coatings), (*Glass, Metal coatings), (*Cathodes, Metal coatings), (*Coatings, Cathodes), Plating, Ions, Silver compounds, Nitrates, Stability, Temperature, Phototubes, Ammonia, Light transmission, Optical properties, Reflection, Optical equipment components, Optical coatings, Films, Metal films.

The basic processes are discussed which are involved in chemical silver-plating of glass surfaces. Some optical phenomena observed in transmitted and reflected light are described. A silvering method is proposed (a modification of Breshir's procedure). The technique yields a silver film designed to meet all technological requirements for nontransparent and semi-transparent photoelectric cathodes. (Author)

AD-417 389 Div. 14
(TISTM/BRW) OTS price $1.60

Naval Applied Science Lab., Brooklyn, N. Y.
REPORT OF RESEARCH AND DEVELOPMENT PROGRAM ON EROSION RESISTANCE OF GLASS REINFORCED PLASTIC MATERIALS.
Final rept.,
by Paul M. Goldfarb. 12 Sep 63, 17p.
Proj. SR007 03 04
NASL Lab. proj. 6045 Unclassified report

Descriptors: (*Laminates, Erosion), (*Laminated plastics, Reinforcing materials), Glass textiles, Heat resistant plastics, Plastics, Epoxy plastics, Polyester plastics, Wear resistance, Coatings, Plastic coatings, Abrasives, Sea water.

The erosion resistance of glass reinforced plastic laminates has been investigated and materials for minimizing erosion have been developed at Naval Applied Science Laboratory. A new test method for determining erosion resistance by flowing sea water containing abrasive particles was developed and is described. Results of the investigation indicate that fire retardant polyester and epoxy laminates are superior to general purpose laminates. Surface overlays such as Dacron, Dynel, canvas and gel coats have also been shown to be effective. Several surface coatings including a modified epoxy formulation have also been developed for maximum protection against erosion. (Author)

AD-417 400 Div. 14, 4
(TISTM/REB) OTS price $4.60

Borden Co., Philadelphia, Pa.
REINFORCED HIGH TEMPERATURE ELASTOMERS.

Quarterly progress rept. no. 3, 1 Apr-30 June 63, by K. C. Tsou, R. N. Boldey and B. D. Halpern. 30 June 63, 43p.
Contracts DA36 034AMC3791 and DA36 034ORD3523RD
Unclassified report

Descriptors: (*Elastomers, Silicone plastics), (*Silicone plastics, Additives), (*Heat resistant materials, Elastomers), Talc, Tensile properties, Silicon compound, Oxides, Dioxides, Silanes, Synthetic rubber, Stability, Temperature, Tests, Titanium compounds, Metalorganic compounds.

The use of certain grades of fibrous talc has been found to improve the high temperature tensile strength of silicone rubbers, when used with modified or unmodified silica. The improvement has been due to both the fibrous nature of the talc as well as the heat-stabilizing effect of the iron oxide present in talc. Optimum loading concentration has been determined. Modification of the fibrous talc by chlorosilanes has been found to be successful, and initial results from the use of such modified talc and the trimethylsilyl (TMS) modified silica result in improving high tensile strength on aging at 500 F and testing at 500 F. It is therefore possible now to achieve tensile of 460 psi for a silicane rubber at 500 F. after aging for 48 hrs at 500 F. When a filler modified with trimethylchlorosilane and vinylchlorosilane was used, the elongation at high temperature was improved. For example, a 35 parts of this filler gave a rubber having 290% elongation at 500 F after 48 hr aging at 500 F, when milled with a high molecular weight dimethylsilicone polymer. (Author)

AD-417 406 Div. 14
(TISTM/AMS) OTS price $1.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
EVALUATION OF THE THERMAL KINETIC PARAMETERS OF NYLON 610 WITHOUT DEGRADATION,
by Robert G. Lauttman. Aug 63, 12p.
DA Task 1A0 10501B010 00 23
AELRDL Technical rept. no. 2378
Unclassified report

Descriptors: (*Nylon, Dehydration), Decomposition, Polymers, Temperature, Dielectric properties, Heat of activation, Chemical reactions, Relaxation time, Absorption, Reaction kinetics.

The methods initiated by Freeman and Carroll for the evaluation of the kinetics of thermal decomposition have been applied to the thermal weight losses of Nylon 610 undergoing dehydration from 20 C to 82.6 C. This has yielded the energy of activation and the order of reaction for this process. This activation energy is compared with the activation energies associated with the alpha and beta dielectric dispersions and it is suggested that these two intermediate dispersions for this polymer cannot be due solely to absorbed water. (Author)

AD-417 436 Div. 14
(TISTM/BRW) OTS price $2.60

Lexington Labs., Inc., Cambridge, Mass.
FEASIBILITY OF FORMING REFRACTORY FIBERS BY A CONTINUOUS PROCESS.
Quarterly progress rept. no. 1, 25 Feb-25 May 63, by William B. Campbell. 25 May 63, 24p.
Contract DA19 020AMC0068X
AMRA CR63 03 1 Unclassified report

Descriptors: (*Ceramic fibers, Production), (*Refractory materials, Fibers), Aluminum compounds, Halides, Oxides, Oxidation, Reduction (Chemistry), Recrystallization, High temperature research, Feasibility studies, Vapors, Phase studies, Crystal growth, Nucleation, Temperature.

Methods for continuous formation of refractory fibers, or whiskers, by vapor phase growth are under investigation. The vapor phase processes are: (a) aluminum halide oxidation and (b) aluminum oxide reduction and recrystallization. Preliminary experimentation with the halide system at temperatures around 1200 C indicates that in order to obtain continuous fiber production, it is essential to (a) control the supersaturation, (b) control the temperature, and (c) probably provide suitable nuclei for crystal growth. (Author)

AD-417 438 Div. 14, 12
(TISTM/ODN) OTS price $9.10

New Departure Div., General Motors Corp., Bristol, Conn.
RESEARCH AND DEVELOPMENT OF AIRFRAME BEARINGS FOR AEROSPACE VEHICLES.
Rept. for May 62-June 63,
by R. J. Matt, J. B. Muratore, R. E. Murteza and C. J. Zupkus. Sep 63, 98p.
Contract AF33 657 8431, Proj. 1315, Task 131501
ASD TDR63 716 Unclassified report

Report on Bearings and Mountings for Advanced Systems.

Descriptors: (*Lubricants, Reentry vehicles), (*Reentry vehicles, Airframe bearings), (*Lubrication, Reentry vehicles), (*Airframe bearings, Reentry vehicles), Friction, Ceramic materials, Cermets, Alloys, Low-temperature research, High-temperature research, Low-pressure research, Control surfaces, Antifriction bearings, Refractory materials, Tests, Space environmental conditions, Test equipment, Aluminum compounds, Oxides, Tantalum alloys, Beryllium alloys, Tungsten compounds, Silicides, Molybdenum compounds, Refractory coatings, Physical properties, Mechanical properties, Tables.

The purpose of the program was to acquire the materials performance characteristics necessary to design control surface bearings for future space re-entry vehicles. The friction, wear, and limiting load capacity of candidate superalloy, cermet, and ceramic specimen materials, with and without lubricants, were studied at temperatures of from -100 to 2500 F in air. Subsequent tests were run at temperatures of from -100 to 1500 F in an ultrahigh vacuum ranging from 10 to the -6th to 10 to the -9th power Torr. Results indicated significant differences in performance of the selected materials. None of the tested lubricants provided any significant improvement. (Author)

AD-417 526 Div. 14, 30
(TISTM/EJH) OTS price $1.60

General Dynamics/Fort Worth, Tex.
A STUDY OF THE COMPRESSION OF POLYTETRAFLOUROETHYLENE (TEFLON) AT ULTRAHIGH PRESSURES.
by R. D. Potter. 27 Dec 61, 17p. Rept. no. ERR FW143
Unclassified report

Descriptors: (*Halocarbon plastics, Compressive properties), (*High pressure research, Halocarbon plastics), (*Hydraulic presses, Halocarbon

plastics). Tables, Temperature, Deformation, Sheets, Test equipment, Materials.

This study of Teflon was done in order to determine the possible side effects of the compressibility of Teflon in relationship to its incidental use in the Uni-Ram. Teflon is used in the Uni-Ram set-up as anti-friction sheeting between each anvil base and the tapered cone surface; it is also used as spacer discs between the anvil side faces in centering the sample and anvils. Conclusions of the data obtained in these compressive studies of Teflon must be somewhat limited due to lack of absolute pressure values. It is apparent that the compressibility factors of Teflon do contribute to the overall h' (closing movement of the top anvil in respect to the bottom support surface of the Uni-Ram, expressed in thousandths of an inch) values obtained with the Uni-Ram set-up. There is an indication that a possible calibration point will be valid in the range of zero to ten tons Ram Force, or the equivalent of about five kilobars. (Author)

AD-417 599 Div. 14, 26
(TISTE/JBM) OTS price $1.10

Pennsylvania State U. Coll. of Engineering and Architecture, University Park.
HIGH PRESSURE IGNITION.
Bi-monthly progress rept. no. 1, 25 May-25 July 60,
by D. F. White. 29 July 60, 2p.
Contract Nobs78674

Unclassified report

Descriptors: (*Ignition, Hydraulic fluids). (*Hydraulic fluids, Ignition). Hydraulic systems, High-pressure research, Tests, Pistons, Gases, Test equipment, Compressible flow, Heat transfer, Compressive properties, Pipes, Hydraulic models, Hazards, Temperature.

Research concerns a study to gain an understanding of the physical processes which govern the ignition, by rapid compression, of hydraulic fluids. An experimental setup was designed, and most of the parts were ordered. Several tests were made in the present apparatus to determine the motion of a piston inserted in the downstream section. Analytical work was started on the problem of heat transfer from the compressed gas in the downstream section. Also see AD's 417 600 through 417 614. (Author)

AD-417 600 Div. 14, 26
(TISTE/JBM) OTS price $1.10

Pennsylvania State U. Coll. of Engineering and Architecture, University Park.
HIGH PRESSURE IGNITION.
Progress rept. no. 2 for 25 July-25 Nov 60,
by D. F. White. 30 Nov 60, 8p.
Contract NObs78674

Unclassified report

Descriptors: (*Ignition, Hydraulic fluids), (*Hydraulic fluids, Ignition), Hydraulic systems, Test equipment, High-pressure research, Pipes, Instrumentation, Compressed air, Pistons, Analysis, Temperature, Gases, Hydraulic models.

Research was continued on a study to gain an understanding of the physical processes which govern the ignition by rapid compression of hydraulic fluids. The construction of the test apparatus is essentially complete, and preliminary testing will begin shortly. A sketch of the layout is shown and a detailed description given of the apparatus. Also see AD's 417 599 and 417 601 through 417 614. (Author)

AD-417 601 Div. 14, 26
(TISTE/JBM) OTS price $1.10

Pennsylvania State U., Coll. of Engineering and Architecture, University Park.
HIGH PRESSURE IGNITION.
Progress rept. no. 3, 26 Nov-26 Jan 61,
by G. M. Faeth. 10 Feb 61, 12p.
Contract NObs78674

Unclassified report

Descriptors: (*Ignition, Hydraulic fluids), (*Hydraulic fluids, Ignition), Hydraulic systems, High pressure research, Temperature, Compressive properties, Test equipment, Heat transfer, Gases, Hydraulic models, Pipes, Analysis, Hazards.

Research was continued on a study of the physical processes which govern the ignition by rapid compression of hydraulic fluids. The construction of the experimental apparatus was completed. A schematic diagram of the apparatus is shown, with a photograph of the valve and the test section. A description of the test apparatus and its operation is given. An analysis was made of the axial and radial transfer of heat from a driven gas. Temperature profiles are given for various pipe diameters. Also see AD-417 599, 417 600 and 417 602 to 417 614. (Author)

AD-417 602 Div. 14, 26
(TISTE/JBM) OTS price $1.60

Pennsylvania State U., Coll. of Engineering and Architecture, University Park.
HIGH PRESSURE IGNITION.
Progress rept. no. 4, 27 Jan-27 Mar 61,
by G. M. Faeth. 31 Mar 61, 15p.
Contract Nobs78674

Unclassified report

Descriptors: (*Hydraulic fluids, Ignition), (*Ignition, Hydraulic fluids), Hydraulic systems, Pipes, Tests, Gases, Compressive flow, Heat transfer, Compressive properties, Hydraulic models, Instrumentation, Recording systems, Stability, Temperature, Mathematical models, Thermocouples, Transducers, Measurement, High pressure research, Hazards, Fluid flow.

Research was continued on a study of the physical processes which govern the ignition, by rapid compression of hydraulic fluids. The necessity of simultaneously recording a number of system variables has lead to comprehensive changes in instrumentation. Evidence of the source of the initiation of Taylor instability at the gaseous interface was found. An analysis of the heat transfer effects during the compression process was made using a rather idealized mathematical model. Comprehensive measurements of gas temperatures in various locations near the end plate were started. The initial results are given. Also see AD-417 599 to 417 601 and AD-417 603 to 417 614. (Author)

AD-417 603 Div. 14, 26
(TISTE/JBM) OTS price $1.60

Pennsylvania State U., Coll. of Engineering and Architecture, University Park.
HIGH PRESSURE IGNITION.
Progress rept. no. 5, 27 Mar-27 May 61,
by G. M. Faeth. 15 June 61, 11p.
Contract NObs78674

Unclassified report

Descriptors: (*Ignition, Hydraulic fluids), (*Hydraulic fluids, Ignition), Pipes, Hydraulic systems, Compressive properties, Compressive

flow, Gases, Pipes, High pressure research, Hazards, Temperature, Measurement, Hydraulic models, Convection, Thermocouples, Instrumentation.

Research was continued on a study of the physical processes which govern the ignition, by rapid compression, of hydraulic fluids. Tests were conducted to measure gas and wall temperature in a 3/8'' I.D. horizontal tube 5 ft. long for a range of release pressures and pressure rise rates. Tests were conducted to compare the gas temperature in a vertically and a horizontally aligned 3/8'' I.D. test section. Calculations were made in an attempt to evaluate the convection heat transfer coefficients for the cooling period following the compression of the gas. Gas temperatures were calculated for a number of pressure rise rates in a 3/8'' I.D. test section, 5 ft. long with a final pressure at the end of the compression process of 525 psig. The agreement between these calculated temperatures and the experimentally obtained true gas temperatures (found by extrapolating the indicated temperatures given by two thermocouples of different diameter) was found to be reasonably good. Due to the design of the thermocouple probes the temperature field at some locations in the driven gas was distributed. This necessitated some redesign of the instrumentation which seems to have eliminated the difficulty. Also see AD 417 599 to 417 602 and AD 417 604 to 417 614. (Author)

AD-417 604 Div. 14, 26
(TISTE/JBM) OTS price $1.60

Pennsylvania State U., Coll of Engineering and Architecture, University Park.
HIGH PRESSURE IGNITION.
Progress rept. no. 6, 28 May-31 July 61, by G. M. Faeth. 7 Aug 61, 15p.
Contract NObs78674

Unclassified report

Descriptors: (*Ignition, Hydraulic fluids), (*Hydraulic fluids, Ignition), Hydraulic systems, High pressure research, Gases, Compressive flow, Compressive properties, Pipes, Hydraulic models, Hazards, Tests, Measurement, Temperature, Gas flow, Turbulence, Convection, Fluid flow, Compressed air.

Research was continued on a study of the physical processes which govern the ignition, by rapid compression, of hydraulic fluids. Tests were conducted to measure gas and wall temperatures in a 7/8 in. I. D. horizontal tube 5 ft. long for a range of pressure rise rates and release pressures. Calculations of gas temperatures were made for (a) 3/8 in. I.D. x 5 ft. long horizontal test section at a final pressure of 2500 psig. (b) 7/8 in. I.D. x 5 ft. long horizontal test section at final pressures of 525 and 2500 psig. Two different pressure rise rates were employed in the calculations for each pipe size and each final pressure, one representing a relatively rapid compression, the other a relatively slow compression. The calculated values of the gas temperature were then compared with the experimentally determined values. A survey of the literature was made on the development of a natural convection flow pattern. The results of this investigation have indicated that there is probably sufficient time for the development of such a flow in the process of venting high pressure air into a dead ended section of pipe. Also see AD-417 599 to 417 603 and AD-417 605 to 417 614. (Author)

AD-417 605 Div. 14, 26
(TISTE/JBM) OTS price $1.60

Pennsylvania State U., Coll. of Engineering and Architecture, University Park.
HIGH PRESSURE IGNITION.
Progress rept. no. 7, 1 Aug-30 Sep 61, by G. M. Faeth. 10 Oct 61, 17p.
Contract Nobs78674

Unclassified report

Descriptors: (*Ignition, Hydraulic fluids), (*Hydraulic fluids, Ignition), High pressure research, Hydraulic systems, Gases, Compressible flow, Compressive properties, Hydraulic valves, Time, Fluid flow, Air, Hydraulic models, Combustion, Fuels, Convection, Tests.

Research was continued on a study of the physical processes which govern the ignition, by rapid compression, of hydraulic fluids. A simplified analysis was made concerning the correlation of the the valve geometry, the system geometry, the valve opening time and the release pressure with the maximum pressure rise rate. The agreement between the theoretical predictions and the experimental results was found to be reasonably good. Initial work on the investigation of charging an air filled closed section of pipe with fluid has begun. A survey of the literature was made on the physical preparation of liquid fuels for combustion. As a result of this investigation a test program was formulated for the initial study of the combustion phase of this project. The development of an analysis for the transient preparation of a liquid fuel has also begun. The experimental apparatus is presently being assembled. A further study was made of correcting the currently used correlation for combined free and forced convection. The new relation will be checked following tests in a 1-1/2 ID test section which is being constructed. Also see AD417599 to 417604 and AD417606 to 417614. (Author)

AD-417 606 Div. 14, 26
(TISTE/JBM) OTS price $1.60

Pennsylvania State U., Coll. of Engineering and Architecture, University Park.
HIGH PRESSURE IGNITION.
Progress rept. no. 8, 1 Oct-30 Nov 61, by G. M. Faeth. 8 Dec 61, 10p.
Contract Nobs78674

Unclassified report

Descriptors: (*Hydraulic fluids, Ignition), (*Ignition, Hydraulic fluids), High pressure research, Temperature, Hydraulic models, Gases, Hazards, Tests, Hydraulic systems, Compressive properties, Fluid flow, Compressible flow, Hydrocarbons, Films, Convection, Analysis, Compressed air, Water, Combustion.

Research was continued on a study of the physical processes which govern the ignition, by rapid compressions, of hydraulic fluids. Preliminary combustion tests were run using Cetane as a test fluid. The general results of these tests are given. A convection correlation was developed for combined free and forced convection in a horizontal tube that suits the analysis employed to determine gas temperatures in the downstream pipe. Construction of the liquid charging apparatus was completed. Preliminary tests, using water as a charging fluid, were run to investigate the nature of the pressure vs. time curve for a rapidly compressed column of air. All of the curves obtained were damped oscillatory in nature with extremely high pres-

sure rise rates and maximum pressures indicated to be far above the driving pressure. Two problem areas arise: (1) Compression ignition; (2) Structural damage to a piping system due to extreme pressures. (Also see AD 417 599 to 417 605 and AD 417 607 to 417 614. (Author)

AD-417 607 Div. 14, 26
(TISTE/JBM) OTS price $1.60

Pennsylvania State U. Coll. of Engineering and Architecture, College Park.
HIGH PRESSURE IGNITION.
Progress rept. no. 9, 1 Dec 61-31 Jan 62, by G. M. Faeth. 14 Feb 62, 14p.
Contract NObs78674

Unclassified report

Descriptors: (*Ignition, Hydraulic fluids), (*Hydraulic fluids, Ignition), High-pressure research, Hydraulic systems, Tests, Hazards, Temperature, Compressive flow, Compressive properties, Hydraulic models, Pipes, Fluid flow, Combustion, Films, Liquids, Test equipment, Gases, Analysis.

Research was continued on a study of the physical processes which govern the ignition, by rapid compression, of hydraulic fluids. Temperature traces were obtained in the 1.5 inch I.D. test section for a number of test conditions. A test apparatus was developed for the study of the combustion of liquid films which provides reproducible data. The results of testing with this apparatus indicate that thicker films are more readily ignited. However, tests employing a fuel saturated wick in the gas stream still leave a strong suspicion that droplets are being formed from the surface of the film making the general applicability of the data somewhat doubtful. A preliminary analysis neglecting frictional effects and heat losses was developed for the liquid charging process. Also see AD-417 599 to 417 606 and AD-417 608 to 417 614. (Author)

AD-417 608 Div. 14, 26
(TISTE/JBM) OTS price $1.60

Pennsylvania State U. Coll. of Engineering and Architecture, College Park.
HIGH PRESSURE IGNITION.
Progress rept. no. 10, 1 Feb-1 Mar 62, by G. M. Faeth. 5 Apr 62, 12p.
Contract NObs78674

Unclassified report

Descriptors: (*Ignition, Hydraulic fluids), (*Hydraulic fluids, Ignition), Hydraulic systems, High-pressure research, Tests, Test equipment, Compressive flow, Pipes, Compressive flow, Hydraulic models, Temperature, Hazards, Fluid flow, Hydrocarbons, Gases, Hydraulic valves.

Research was continued on a study of the physical processes which govern the ignition, by rapid compression, of hydraulic fluids. The 7/8 inch I.D. test section was modified to allow testing of a fog of fluid having droplets with a diameter less than 10 microns. Testing was in this apparatus using Cetane as a test fluid. While these tests have not yet been completed, the initial indications are that the fog will ignite at pressure rise rates slightly lower than those for which the wick will ignite, for a given final pressure. Calculations have begun to determine the maximum temperatures attained in the driven gas for a variety of pressure rise rates and final pressures. The liquid charging test apparatus was modified in order to study the throttling effects in terms of the size of an orifice inserted immediately upstream of the valve. A series of tests was run using the modified apparatus. (Also see AD-417 599 to 417 607 and AD-417 609 to 417 614). (Author)

AD-417 609 Div. 14, 26
(TISTE/JBM) OTS price $3.60

Pennsylvania State U., Coll. of Engineering and Architecture, University Park.
IGNITION OF HYDRAULIC FLUIDS IN HIGH PRESSURE PIPE SYSTEMS.
Progress rept. no. 11, 1 Apr-31 May 62, by G. M. Faeth. 28 June 62, 1v.
Contract NObs78674

Unclassified report

Descriptors: (*Ignition, Hydraulic fluids), (*Hydraulic fluids, Ignition), High pressure research, Hydraulic systems, Hazards, Temperature, Tests, Compressive flow, Compressive properties, Pipes, Test equipment, Gases, Hydrocarbons, Fuels, Combustion, Liquids, Time.

Research was continued on a study of the physical processes which govern the ignition, by rapid compression, of hydraulic fluids. Maximum gas temperature calculations were completed for the 7/8 inch I.D. test section. The results of these calculations are shown. Combustion tests were completed for Cetane and Mil 2190 TEP in the 7/8 inch I.D. test section. Two methods of fuel introduction were used, microfog and a wick saturated with the test fluid. The results of these tests are summarized. The combustion test modifications were completed for the 3/8 inch and 1 1/2 inch I.D. test sections. An analysis for the case where the charging process is governed only by entrance and throttling losses was made for the liquid charging case. Expressions for predicting the pressure vs. time curve and the maximum pressure rise rate were derived and show good agreement with test results. Also see AD-417 599 to 417 608 and AD-417 610 to 417 614. (Author)

AD-417 610 Div. 14, 26
(TISTE/JBM) OTS price $2.60

Pennsylvania State U. Coll. of Engineering and Architecture, University Park.
IGNITION OF HYDRAULIC FLUIDS IN HIGH PRESSURE PIPE SYSTEMS.
Progress rept. no. 12 for 1 June-31 July 62, by G. M. Faeth. 22 Aug 62, 1v.
Contract NObs78674

Unclassified report

Descriptors: (*Ignition, Hydraulic fluids), (*Hydraulic fluids, Ignition), High-pressure research, Hydraulic systems, Hazards, Temperature, Pipes, Gases, Compressible flow, Compressive properties, Combustion, Tests, Fluid flow, Oils, Analysis, Liquids.

Research was continued on a study of physical processes which govern the ignition, by rapid compression, of hydraulic fluids. Maximum gas temperature calculations were completed for the 3/8 inch I. D. test section. The results of these calculations are shown. Combustion tests were completed in the 7/8 inch I. D. test section for Cellulube 220 and Houghton-Safe 1055, and in the 3/8 inch I. D. test section for these fluids and Mil 2190 TEP. Combustion tests were completed in the 7/8 inch I. D. test section for the series of napthanic neutral oils with flash points varying from 300 to 500 F. The results

indicate that the variation in flash point had no significant effect on the combustion limit curve. An analysis was made in order to determine the maximum pressures attainable in the event combustion does occur in the case of the liquid charging study. Also see AD-417 599 to AD-417 609 and AD-417 611 to AD-417 614. (Author)

AD-417 611 Div. 14, 26
(TISTE/JBM) OTS price $1.10

Pennsylvania State U. Coll. of Engineering and Architecture, University Park.
IGNITION OF HYDRAULIC FLUIDS IN HIGH PRESSURE PIPE SYSTEMS.
Progress rept. no. 13 for 1 Aug-30 Sep 62, by G. M. Faeth. 11 Oct 62, 7p.
Contract NObs78674

Unclassified report

Descriptors: (*Hydraulic fluids, Ignition), (*Ignition, Hydraulic fluids), Hydraulic systems, High-pressure research, Hazards, Temperature, Compressible flow, Compressive properties, Pipes, Gases, Temperature, Tests, Combustion.

Research was continued on the study of physical processes which govern the ignition, by rapid compressions, of hydraulic fluids. Maximum gas temperature calculations were completed for the 1-1/2 inch I.D. test section. The results of these calculations are shown. Tests were started to evaluate the effect of downstream length on the temperature of the driven gas. The heating values of Mil 2190 and Cellulube were determined. A test program is underway in order to establish the accuracy of the numerical solution for the liquid charging process. Also see AD-417 599 to AD-417 610 and AD-417 612 to AD-417 614. (Author)

AD-417 612 Div. 14, 26
(TISTE/JBM) OTS price $1.60

Pennsylvania State U. Coll. of Engineering and Architecture, University Park.
IGNITION OF HYDRAULIC FLUIDS IN HIGH PRESSURE PIPE SYSTEMS.
Progress rept. no. 14 for 1 Oct-30 Nov 62, by G. M. Faeth. 13 Dec 62, 11p.
Contract NObs78674

Unclassified report

Descriptors: (*Hydraulic fluids, Ignition), (*Ignition, Hydraulic fluids), Hydraulic systems, High-pressure research, Hazards, Temperature, Compressible flow, Compressive properties, Tests, Hydraulic models, Gases, Combustion, Liquids, Analysis, Pipes.

Research was continued on a study of the physical processes which govern the ignition, by rapid compression, of hydraulic fluids. The test series on the effect of the length of the test section was completed. The results of these tests indicate that any throttling downstream of the valve can cause increases in the temperature of the driven gas. With such throttling absent, temperatures were slightly higher in the longer test sections in the period following the compression. The instrumented combustion tests were completed. The liquid charging analysis was simplified and numerical calculations completed for driving pressures from 600 to 2000 psig. Experimental and numerical results compare favorably. Also see AD-417 599 to AD-417 611 and AD-417 613 to AD-417 614. (Author)

AD-417 613 Div. 14, 26
(TISTE/JBM) OTS price $1.10

Pennsylvania State U. Coll. of Engineering and Architecture, University Park.
IGNITION OF HYDRAULIC FLUIDS IN HIGH PRESSURE PIPE SYSTEMS.
Progress rept. no. 15, 1 Dec 62-31 Jan 63, by G. M. Faeth. 11 Feb 63, 3p.
Contract NObs78674

Unclassified report

Descriptors: (*Ignition, Hydraulic fluids), (*Hydraulic fluids, Ignition), Hydraulic systems, High-pressure research, Pipes, Hazards, Compressible flow, Compressive properties, Combustion, Oils, Tests, Analysis, Programming (Computers), Temperature, Gases, Liquids, Elasticity.

Research was continued on a study of the physical processes which govern the ignition, by rapid compression, of hydraulic fluids. The combustion tests on MIL 2190 TEP was completed. The variation between the different oils was found to be small and the present results compare quite favorably with earlier tests conducted in this program. The analysis for the maximum gas temperature was programmed for the IBM 7074 computer. Recalculations were preformed for the 3/8, 7/8 and 1-1/2 inch I.D. pipes. These recalculated results were found to be somewhat different from the previous hand calculated results at higher pressure rise rates and final pressures. Tests were started to measure maximum gas temperatures for a variety of operating conditions. The analysis for elasticity effects in the liquid charging process was completed. Also see AD-417 599 to AD-417 612 and AD-417 614. (Author)

AD-417 614 Div. 14, 26
(TISTE/JBM) OTS price $1.10

Pennsylvania State U. Coll. of Engineering and Architecture, University Park.
IGNITION OF HYDRAULIC FLUIDS IN HIGH PRESSURE PIPE SYSTEMS.
Progress rept. no. 16, 1 Feb-31 Mar 63, by G. M. Faeth. 11 Apr 63, 8p.
Contract NObs78674

Unclassified report

Descriptors: (*Ignition, Hydraulic fluids), (*Hydraulic fluids, Ignition), High-pressure research, Tests, Hazards, Hydraulic systems, Gases, Temperature, Pipes, Compressible flow, Compressive properties.

Research was continued on a study of the physical processes which govern the ignition, by rapid compression, of hydraulic fluids. The tests to obtain maximum gas temperatures were completed. The results of measurements obtained in the 3/8, 7/8 and 1-1/2 inch test sections are shown. Calculations were completed for maximum gas temperatures when the initial temperature is varied. A portion of these results are given. Also see AD-417 599 to AD-417 613. (Author)

AD-417 621 Div. 14, 32
(TISTM/ODN) OTS price $2.75

Ohio State U. Engineering Experiment Station, Columbus.
CRITICAL SURVEY OF MECHANICAL PROPERTY TEST-METHODS FOR BRITTLE MATERIALS.
Rept. for 15 Mar 62-14 Mar 63, by William B. Shook. July 63, 136p.
Contract AF33 657 8064, Proj. 7381, Task 738105
ASD Rept. no. TDR63 491

Unclassified report

Report on Materials Application.

Descriptors: (*Brittleness, Materials), (*Reviews, Test methods), (*Ceramic materials, Brittleness), Mechanical properties, Glass, Failure (Mechanics), Compressive properties, Elasticity, Tensile properties, Impact shock, Deformation, Stresses, Hardness, Creep, Fatigue (Mechanics), Thermal stresses, Internal friction, Frequency, Time, Weight, Measurement.

A critical survey of the state-of-the-art of mechanical property tests of brittle materials is presented. The format utilized in presenting the information is based on property categories, since no significant breakdown for specific materials is justified. The common characteristics of the materials included in the survey permit general testing procedures to be discussed, with special adaptations developed for certain materials being applicable to all. The capabilities in programming test performance variables have exceeded the ability to define materials and performance requirements. Large gaps still remain in the statistical interpretation of strength and other material parameters, particularly under conditions of complex stress-state and with previous exposure to testing conditions. Certain probabilistic descriptors have shown promising indications, but much remains to be explored in this area. (Author)

AD-417 635 Div. 14, 25
(TISTP/MH) OTS price $10.10

Korad Corp., Santa Monica, Calif.
RESEARCH ON COHERENT ELECTROMAGNETIC RADIATION MATERIALS.
Final rept.,
by R. C. Pastor and R. H. Hoskins. Aug 63, 121p.
Contract AF33 657 8750, Proj. 5237, Task 523701
ASD TDR63 747 Unclassified report

Descriptors: (*Lasers, Materials), (*Materials, Lasers), Ruby, Research program administration, Energy, Power, Crystal growth, Powders, Ammonium compounds, Aluminum compounds, Refractory materials.

Improvement of laser materials with respect to high output energy and power. Emphasis has been on the growth and evaluation of ruby. Results of detailed studies of the Verneuil (flame fusion) method of crystal growth and, in particular, the technology of the starting powder are presented. Several methods which have been developed for evaluation of rubies, including laser testing, are described. The solutions to several problems relating to crystal quality are given. A substantial improvement in the size and quality of ruby laser crystals was affected during the contract period. Data obtained on other potential laser materials is included. (Author)

AD-417 676 Div. 14, 12, 27
(TISTM/ODN) OTS price $5.60

Hercules Powder Co., Bacchus, Utah.
HISTORY OF OZONE CRACKING IN BUNA-S RUBBER - WING II INTERNAL INSULATION - WEAPON SYSTEM 133A,
by G. H. Berhold. Sep 63, 1v. Rept. no. MTO269 39
Contract AF04 647 243
Unclassified report

Descriptors: (*Elastomers, Degradation), (*Synthetic rubber, Degradation), (*Ozone, Degradation), (*Thermal insulation, Rocket motors (Solid propellant)), Guided missiles (Surface-to-surface), Air Force, Booster motors, Erosion, Processing, Data, Physical properties, Mechanical properties, Tensile properties, Elasticity, Hardness, Deformation, Tests, Weapon systems.

In the normal assembly sequence of Rocket Motor M-57E1, Spiralloy cases are wound upon a Buna-S rubber internal insulator. In October 1962, the internal insulators of several motors were found to contain surface cracks. Two inspection programs were initiated to examine each case and categorize the magnitude of cracking. About 46% of the cases examined were cracked to depths ranging to a maximum of 0.060 in. Analysis of these results showed that the cracks occurred in areas of residual rubber stress and were a form of deterioration caused by normal exposure of the insulator to the atmosphere over a period of time. Effects of ozone cracking were then evaluated. Case bond strength was determined in one series of tests. In another test series, erosion rates of ozone cracked specimens were compared to that of control samples in test firings of hundred-pound-charge motors. Results of these tests indicated that ozone cracking has no effect on case bond strength or erosion rate of the Buna-S rubber internal insulators. (Author)

AD-417 684 Div. 14
(TISTM/AM) OTS price $2.60

General Electric Co., Syracuse, N. Y.
STANDARDIZATION ENGINEERING PRACTICES STUDY, TASK 701: HIGH FREQUENCY CHARACTERISTICS OF CERAMIC MATERIALS.
Quarterly progress rept. no. 3, 1 Mar-31 May 63,
by Elmer F. Hansen. 31 May 63, 20p.
Contract DA36 039amc00008(E)
Unclassified report

Descriptors: (*High frequency, Ceramic materials), (*Ceramic materials, High frequency), Test methods, Cavity resonators, Reflectometers, Military requirements, Dielectric properties, Measurements, Data, Rods, Tables, Quartz, Glass, Specification.

An investigation of available test procedures, such as the ''resonant cavity'' method and the ''free space reflectometer'' method, among others, which will provide reproducible values for the dielectric constant and dissipation factor of ceramic materials at 1.0, 3.0, 8.6, and 24 KMc. The study should be based upon evaluation of those ceramic insulating materials having good dielectric properties which have met the qualification requirements of Military Specification MIL-I-10, ''Insulating Materials, Electrical, Ceramic, Class L''. This investigation should also provide for a literature review of the test procedure, apparatus and data used in and resulting from a study conducted by Battelle Memorial Institute, wherein the slotted-line method, using a dielectrometer, was established as the test procedure. Results of the Battelle work should be correlated with results of this study. (Author)

AD-417 709 Div. 14, 27, 31
(TISTM/AMS) OTS price $9.60

Bureau of Ships, Washington, D. C.
USE OF DIESEL OILS WITH ADDITIVES (PRIMENENIE DIZELNYH MASEL S PRISADKAMI),
by Gheorghi Andreevich Morozov and tr. by Alick de Montmorency. Aug 63, 110p.
BUSHIPS TN824 Unclassified report

Trans. from State Scientific and Technical Publications of Petroleum and Fuel Mining Literature Leningrad Division, Leningrad - 1962.

Descriptors: (*Diesel engines, Lubricants), (*Lubricants, Diesel engines), Physical properties, Chemical properties, Viscosity, Lubricant additives, Lubrication, Oils, Petroleum, Data.

AD-417 774 Div. 14, 4
(TISTM/REB) OTS price $1.60

IIT Research Inst., Chicago, Ill.
PREPARATION AND EVALUATION OF NEW HYDRAULIC FLUIDS.
Progress rept. no. 7, 28 May-27 June 63.
June 63, 14p. Rept. no. ARF C6001 7
Contract NObs88249, Proj. C6001
Unclassified report

Descriptors: (*Hydraulic fluids, Synthesis (Chemistry)), (*Organic compounds, Hydraulic fluids), Fluorination, Sulfur compounds, Fluorides, Alkenes, Chlorides, Chlorine compounds, Heat-resistant materials, Organic sulfur compounds, Halogenated hydrocarbons, Viscosity, Infrared spectroscopy.

The purpose of this project is to develop new fire-resistant hydraulic fluids based on fluorinated, sulfur-containing compounds. The compounds will be synthesized specifically to meet the critical property requirements. Various derivatives of sulfur hexafluoride and other fluorinated materials are being investigated. The program consists of four phases: Simon's cell fluorinations, fluorinations with metallic fluorides, addition of sulfur-chloride pentafluoride to olefins, and determination of physical and chemical properties. (Author)

15. MATHEMATICS

AD-417 107 Div. 15, 25
(TISTP/HG) OTS price $1.10

RAND Corp., Santa Monica, Calif.
A NOTE ON INVARIANT IMBEDDING AND GENERALIZED SEMI-GROUPS,
by Richard Bellman and Thomas A. Brown. Sep 63, 5p. Memo. no. RM3834PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Partial differential equations, Neutron transport theory), Differential equations, Simultaneous equations, Equations, Functions, Inequalities, Fluxes, Shock, Groups.

The use of fixed-point techniques is extended to the solution of certain partial differential equations. These equations have application to problems of neutron transport. (Author)

AD-417 150 Div. 15
(TISTP/FEM) OTS price $17.50

Center for Operations Research Mass. Inst. of Tech., Cambridge.
MARKOVIAN DECISION PROCESSES WITH UNCERTAIN TRANSITION PROBABILITIES OR REWARDS,
by Edward Allan Silver. Aug 63, 256p. Technical rept. no. 1
Contract Nonr1841 87
Unclassified report

Adapted from a Doctoral Thesis.

Descriptors: (*Statistical processes, Statistical distributions), (*Probability, Sampling), Mathematical logic, Mathematical prediction, Simulation, Real variables, Equations, Mathematical models, Sequential analysis.

In most Markov process studies to date it has been assumed that both the transition probabilities and rewards are known exactly. The primary purpose of this thesis is to study the effects of relaxing these assumptions to allow more realistic models of real world situations. The Bayesian approach used leads to statistical decision frameworks for Markov processes. The first section is concerned with situations where the transition probabilities are not known exactly. One approach used incorporates the concept of multi-matrix Markov processes, processes where it is assumed that one of several known transition matrices is being utilized, but we only have a probability vector on the various matrices rather than knowing exactly which one is governing the process. The second approach assumes more directly that the transition probabilities themselves are random variables. It is shown that the multidimensional Beta distribution is a most convenient distribution (for Bayes calculations) to place over the probabilities of a single row of the transition matrix. Several important properties of the distribution are displayed. Then a method is suggested for determining the multidimensional Beta prior distributions to use for any particular Markov process. (Author)

AD-417 220 Div. 15, 28
(TISTB/MS) OTS price $7.60

Massachusetts Inst. of Tech., Cambridge.
MARKOVIAN DECISION PROCESSES WITH UNCERTAIN TRANSITION PROBABILITIES OR REWARDS,
by Edward Allan Silver. Aug 63, 256p. Technical rept. no. 1
Contract Nonr184187
Unclassified report

Report on Research in the Control of Complex Systems.

Descriptors: (*Statistical processes, Decision making), Matrix algebra, Probability, Mathematical models, Control.

In most Markov process studies to date it has been assumed that both the transition probabilities and rewards are known exactly. The primary purpose of this thesis is to study the effects of relaxing these assumptions to allow more realistic models of real world situations. The Bayesian approach used leads to statistical decision frameworks for Markov processes. The first section is concerned with situations where the transition probabilities are not known exactly. It is shown that for decision purposes the expected values of the steady state probabilities are important quantities. For a special 2-state situation, use of the hypergeometric function (previously utilized in the solution of certain physics problems) permits evaluation of these expected values. The main problem considered is one where we have the option of buying observations of a Markov process so as to improve our knowledge of the unknown transition probabilities before deciding whether or not to utilize the process. In the second section of the study, we assume that the transition probabilities are exactly known, but now the rewards are random variables. (Author)

Division 15 - MATHEMATICS

AD-417 221 Div. 15
(TISTP/HG) OTS price $5.60

Massachusetts Inst. of Tech., Cambridge.
THE TRANSIENT SOLUTIONS FOR 3-STATE DISCRETE TIME MARKOV PROCESSES,
by Edward A. Silver. July 63, 55p. Technical note no. 1
Contract Nonr184187
Unclassified report

Report on Research in the Control of Complex Systems.

Descriptors: (*Statistical processes, Analysis), Statistical analysis, Functions, Programming (Computers), Probability, Series, Transformations (Mathematics), Matrix algebra, Polynomials, Equations, Oscillations.

Through the combined use of flow graph analysis, geometric transform techniques and the properties of quadratic functions, there are obtained closed form expressions for the transient solution of any time-discrete 3-state Markov process. The results are significantly more complex than in the 2-state case. For evaluating the actual multi-step transition probabilities there are 5 different cases to be considered. The two critical quantities which decide which case is to be used are M and q which, in turn, are involved quadratic functions of the six transition probabilities. Furthermore, there are 13 different possible general transient behaviors. (Author)

AD-417 380 Div. 15, 8
(TISTP/FEM) OTS price $1.60

Israel Inst. of Tech. (Haifa).
PRODUCTS OF AUTOMATA AND THE PROBLEM OF COVERING.
by Abraham Ginzburg and Michael Yoeli. July 63,
Technical rept. no. 15
Contract N62558 3510
Unclassified report

Descriptors: (*Topology, Transformations (Mathematics). (*Algebraic topology, Automation). (*Automation, Sequential analysis). Groups (Mathematics). Cascade structures, Computers, Synthesis.

Convenient relational techniques for the description and study of complete or partial, finite or infinite automata are introduced. By associating with every input two binary relations we obtain an easy and concise algebraic method for the study of homomorphisms and covering of automata. The concept of semi-automaton (called X-automaton) was previously introduced and methods for its decomposition by means of overlapping partitions were derived. These investigations are extended to automata and the problems of covering specified automata by direct and cascade products are studied. Although the approach in this paper is purely algebraic, the results are applicable to the engineering problem of synthesizing sequential machines. (Author)

AD-417 491 Div. 15
(TISTP/FEM) OTS price $1.10

Minnesota U., Minneapolis.
(No title).
Final status rept., 1 June 62-1 June 63,
by R. H. Cameron, G. E. Baxter, H. Furstenberg, F. B. Knight and O. Barndorff-Nielsen.
June 63, 5p.
Grant AF AFOSR62 252
AFOSR Rept. no. 5277 Unclassified report

Descriptors: (*Stochastic processes, Combinatorial analysis), (*Functional analysis, Special functions), Integration, Integrals, Numerical analysis, Probability, Topology, Groups (Mathematics), Mathematical models, Research program administration.

A number of problems in Functional Analysis, Integration in Function Space, Stochastic Processes and related areas have been studied and several papers have been written. (Author)

AD-417 492 Div. 15
(TISTP/FEM) OTS price $1.10

California U., Berkeley.
(No title).
Final status rept., 1 June 62-31 May 63,
by P. Emery Thomas. July 63, 3p.
Grant AF AFOSR62 291
AFOSR Rept. no. 5272 Unclassified report

Descriptors: (*Algebraic geometry, Spheres). (*Algebraic topology, Transformations (Mathematics)). Research program administration, Numbers, Scientific research, Mathematics.

AD-417 581 Div. 15
(TISTP/HG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON A METHOD OF SUCCESSIVE APPROXIMATIONS FOR THE SOLUTION OF OPTIMAL CONTROL PROBLEMS,
by I. A. Krylov and F. L. Chernous'ko. 1 Aug 63, 15p.
FTD TT63 701 Unclassified report

Trans. from Zhurnal Vychislitel'noy Matematiki I Matematicheskoy Fiziki, 2:6, pp. 1132-1139, 1962.

Descriptors: (*Boundary value problems, Numerical analysis), (*Nonlinear systems, Control), Differential equations, Functions, Vector analysis, Integrals, Linear systems, Integration, Equations, Computers.

The determination of optimal control for a process, which is described by a system of ordinary differential equations of the nth order, is reduced to a boundary value problem for a system of equations of the 2nth order. The solution of boundary value problems for complex non-linear systems often encounters significant computational difficulties and requires a large expenditure of machine time. Theorefore, methods of solving optimal control problems, which permit the circumvention of these difficulties, are presented for consideration. A method of successive approximations, which is based on the maximal principle, is proposed for the determination of optimal control in problems with an open right limit. (Author)

AD-417 622 Div. 15
(TISTP/MH) OTS price $2.60

Hebrew U., (Israel).
MEASURES OF SYNTACTIC COMPLEXITY,
by Y. Bar-Hillel, A. Kasher and E. Shamir. Aug 63, 26p. TR no. 13
Contract N62558 3510, Proj. NR049 130
Unclassified report

Descriptors: (*Mathematical logic, Mathematical models), (*Language, Mathematical logic), Topology, Theory, Vocabulary, Arithmetic progression, Documentation, Integrals, Information retrieval.

The aim of this report is (1) to establish certain formal connections between three explicata for the concept of syntactic complexity, that have been discussed in recent literature: degree of nesting, degree of self-embedding, and depth of postponed symbols, and (2) to present a formal (and trivial) proof of what has been called the Anti-Wittgensteinian Thesis: Not everything that can be said at all can be said by using syntactically simple sentences exclusively. This thesis is shown to hold for all standard propositional logics, under the assumption that they contain means of expressing infinitely many different sentences and under all plausible conceptions of semantic equivalence; it is also proved true for a certain calculus of arithmetical functions. (Author)

AD-417 663 Div. 15
(TISTP/WH) OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
STOCHASTIC ANALYSIS OF MULTI-COMPARTMENT SYSTEMS,
by G. Marsaglia. July 63, 22p. Rept. no.
D1 82 0280 and Math note no. 313
Unclassified report

Also available from the author.

Descriptors: (*Particles, Motion), (*Stochastic processes, Diffusion), Simultaneous equations, Differential equations, Probability, Statistical distributions, Feedback.

This is a discussion of methods for describing, mathematically, flows between compartments in a multi-compartment system. We will give the conventional theory, based on the solution of a system of linear differential equations; we will also give a theory based on probability, viewing the system as a collection of 'states' with a particle moving from state to state with certain probabilities, remaining in each state a random time with an exponential distribution. Finally, we will take still another approach, again based on probability theory, in which we consider the sojourn time of a particle, that is, the time it spends after leaving a given compartment before returning to that compartment. (Author)

AD-417 664 Div. 15
(TISTP/HG) OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
SOME APPLICATIONS OF FRACTIONAL INTEGRATION,
by Arthur Erdelyi. Aug 63, 23p. Rept. no.
D1 82 0286 and Math note no. 316
Unclassified report

Also available from the author.

Descriptors: (*Integrals, Mathematical analysis), Partial differential equations, Potential theory, Integral equations, Functional analysis, Operators (Mathematics), Functions, Integral transforms, Integration, Boundary value problems, Complex variables.

Seeks to demonstrate the usefulness of fractional integrals in applied mathematics by presenting some of their applications to axially symmetric potential problems and showing that one can obtain in this manner both general theorems and explicit solutions of concrete problems. (Author)

AD-417 667 Div. 15
(TISTP/MH) OTS price $11.50

Iowa State U., Iowa City.
SIMULTANEOUS OBSERVABILITY AND THE LOGIC OF QUANTUM MECHANICS,
by James C. T. Pool. June 63, 1v. Rept. no.
SUI63 17
Grant AFOSR62 122
AFOSR 5268
Unclassified report

Descriptors: (*Quantum mechanics, Mathematical logic), Probability, Analysis, Algebra, Mathematical analysis, Operators (Mathematics), Theory, Distribution, Models.

The axiomatization of quantum mechanics formulated by G. W. Mackey is based on several physically plausible axioms. Heuristic interpretations of the properties of the collection of all observable quantities and the collection of all states of a physical system motivate these axioms. The axioms characterize a logical structure consisting of a sigma-orthocomplete, orthomodular, orthocomplemented, partially ordered set, called a logic, and a sigma-convex, sufficient set of probability gages on the logic. The elements of the logic, called questions, are interpreted as mathematical constructs representing the experimental propositions concerning the physical system, while each probability gage represents a possible state of the physical system. (Author)

AD-417 668 Div. 15
(TISTP/HG) OTS price $6.60

Chicago U., Ill.
SIMPLE METHODS FOR ANALYZING THREE-FACTOR INTERACTION IN CONTINGENCY TABLES,
by Leo A. Goodman. 1963, 59p.
Contract Nonr212123, Proj. NR342 043
Unclassified report

Descriptors: (*Statistical analysis, Tables), Statistical tests, Simultaneous equations, Statistical distribution, Probability, Equations, Numerical methods and procedures, Frequency, Matrix algebra, Inequalities, Theory, Factor analysis.

The report discusses the testing of H sub zero in the I x J x K table, and presents a method for obtaining simultaneous confidence intervals for all the three-factor ineractions in this table. (Author)

AD-417 751 Div. 15
(TISTP/HG) OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
A CONFLUENT HYPERGEOMETRIC INTEGRAL TRANSFORM,
by T. P. Higgins. June 63, 12p. Rept. no. D1 82 0260
Unclassified report

Also available from the author.

Descriptors: (*Integral transforms, Special functions), Integrals, Operators (Mathematics), Equations, Integration.

Inversion integrals have been derived for a Gauss hypergeometric function transform. These inversions were of two types. The first or simple inversion involved no hypergeometric functions explicitly but just an iterated fractional integral; the second or symmetric inversion involved a hypergeometric function with one arbitrary parameter. It is to be expected that similar formulas should apply for a confluent hypergeometric function transform. Both the hypergeometric function and the confluent hypergeometric function transforms are generalizations of other transforms. The confluent transform may have interest because special cases include Bessel, Whittaker, parabolic cylinder, Hermite, and Laguerre function transforms. (Author)

Division 15 - MATHEMATICS

AD-417 777 Div. 15
(TISTP/HG) OTS price $5.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN INTRODUCTION TO ESTIMATION THEORY FOR DYNAMICAL SYSTEMS,
by Fred C. Schweppe. 28 Aug 63, 48p. Rept. no. 22G15
Contract AF19 628 500
AFESD TDR63 549 Unclassified report

Descriptors: (*Topology, Transformations (Mathematics)), (*Statistical analysis, Linear systems), (*Linear systems, Stochastic processes), Theory, Vector analysis, Matrix algebra, Special functions, Statistical functions, Equations, Sampling, Mathematical models, Statistical processes, Time, Errors, Measurement, Correlation techniques, Differential equations, Curve fitting, Least squares method.

Estimation (filtering) theory for dynamical systems is reviewed. Emphasis is on time varying systems and nonstationary stochastic processes. The basic ideas for linear systems are presented in an intuitive manner using time domain techniques and the state variable concept. Both continuous and discrete time systems are discussed. A control problem and the principle of least squares curve fitting are related to the basic estimation problem. In addition to the presentation of fundamental principles for linear systems, brief discussions on a wide variety of related subjects are included in an appendix. (Author)

16. MEDICAL SCIENCES

AD-417 157 Div. 16
(TISTB/WA) OTS price $9.60

406th Medical General Lab., Tokyo (Japan).
ANNUAL PROGRESS REPORT 1 JULY 1962 - 30 JUNE 1963,
30 June 63, 108p.
Unclassified report

Descriptors: (*Parasites, Medical research), Therapy, Diagnosis, Immunology, Pathology, Viruses, Schistosoma, Disease vectors, Culicidae, Encephalitis virus, Military personnel, Epidemiology, Index.

AD-417 176 Div. 16
(TISTB/AAR) OTS price $.50

Behavioral Sciences Lab., Aerospace Div., Wright-Patterson Air Force Base, Ohio.
CORRELATION BETWEEN VISUAL AND AUDITORY VIGILANCE PERFORMANCE,
by Louis T. Pope and Don F. McKechnie. July 63, 6p.
Proj. 7184, Task 718406
AMRL TDR63 57 Unclassified report

Descriptors: (*Vision, Performance tests), (*Auditory nerves, Performance tests), (*Attention, Performance tests), Psychology, Signals, Detection, Sensitivity, Laboratory equipment, Physiology.

This study investigated the relationship between individual performance on a visual vigilance task and an auditory vigilance task. Each of 40 male college subjects participated in two 35-minute test trials, one visual and one auditory. In each 35-minute trial five randomly spaced vigilance signals were presented. Various indices of correlation computed from the data obtained in this study show no relationship between auditory and visual vigilance performance. The percentage of signals detected is probably affected by sensory acuity factors; however, the data of this study did not provide a test of this hypothesis. Other studies should be conducted, comparing the decrement in detection efficiency rather than the percentage of total signals detected. This suggested measure should be less sensitive to sensory acuity components of vigilance than the over-all percentage detection measure used in this study. (Author)

AD-417 290 Div. 16
(TISTB/AAR) OTS price $2.60

Aerospace Industries Association of America, Inc., Downey, Calif.
SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS A. BIOSCIENCES.
22 Aug 63, 24p.
AID Rept. no. P63 108
Unclassified report

Descriptors: (*Biology, Scientific research), (*Space biology, Reviews), Space medicine, Physiology, Psychology, Survival, Close-cycle ecological system, Vehicles.

AD-417 334 Div. 16
(TISTB/WA) OTS price $1.10

Naval School of Aviation Medicine, Pensacola, Fla.
THE PROGNOSTIC VALUE OF THE COLD PRESSOR TEST AND THE BASAL BLOOD PRESSURE BASED ON AN EIGHTEEN-YEAR FOLLOW-UP STUDY,
by William R. Harlan, Jr., Robert K. Osborne and Ashton Graybiel. 1 July 63, 8p.
Proj MR005.13 3001
NSAM Rept. no. 6 Unclassified report

Descriptors: (*Blood pressure, Hypertension), (*Hypertension, Blood pressure), Metabolism, Low temperature research, Physiology, Stimulation, Medical research.

The cold pressor test has been evaluated in a prospective study of young normal individuals followed over an eighteen-year period. The cold pressor response did not correlate with subsequent blood pressure, with interval blood pressure increment, or the development of hypertension. An important relationship was found, however, between basal blood pressure recorded prior to the test and blood pressures recorded eighteen years later. (Author)

AD-417 360 Div. 16
(TISTB/AAR) OTS price $1.60

New York State Coll. of Agriculture, Cornell U., Ithaca.
THE EFFICIENCY OF ANCESTOR RECORDS IN ANIMAL SELECTION.
1963, 14p. Technical rept. no. 12
Contract Nonr40139, Proj. NR042 212
Unclassified report

Descriptors: (*Genetics, Selection), Animals, Mathematical analysis, Performance tests, Theory.

An expression is derived for the efficiency of a selection index based on ancestor records, measured as the correlation between index and true additive genetic merit. The maximum efficiency for infinite generations of ancestors is obtained and compared with the efficiency of using only one or two generations. Comparisons are also made with the use of sibling records, performance testing and progeny-testing. (Author)

AD-417 386 Div. 16
(TISTB/AAR) OTS price $1.60

New York State Coll. of Agriculture, Cornell U., Ithaca.
THE USE OF ALTERNATIVE TRAITS IN SELECTION PROGRAMS,
by S. R. Searle. Aug 63, 12p. Technical rept. no. 11
Contract Nonr409 39, Proj. NR042 212
Unclassified report

Descriptors: (*Genetics, Selection), (*Population, Genetics), Mathematical analysis, Intensity, Probability.

AD-417 395 Div. 16
(TISTB/AAR) OTS price $1.50

General Electric Co., Philadelphia, Pa.
THE PATHOPHYSIOLOGY OF DISUSE AND THE PROBLEM OF PROLONGED WEIGHTLESSNESS: A REVIEW.
Report for Dec 60-Mar 63,
by Richard W. Lawton. June 63, 46p.
Proj. 7222, Task 722201
AMRL TDR63 3 Unclassified report

Descriptors: (*Weightlessness, Physiology), Pathology, Gravity (Artificial), Reviews, Man, Space flight, Simulation.

The physiological implications of zero-G as encountered in space flight are discussed and the available research concerning the physiological effects of weightlessness is reviewed. The purpose of this review is to proceed from the present state of knowledge of normal human physiological systems, particularly as their structure and function are affected by gravity, to a consideration of the possible physiological consequences of prolonged human exposure to zero-G. Methods used to produce and to simulate zero-G are briefly reviewed. The data suggesting that prolonged weightlessness will be a deconditioning environment is presented. This data is considered for possible untoward effects of prolonged exposure to weightlessness, and for methods of prevention of undesired effects. The problem of artificial gravity by rotation of a space vehicle is briefly considered. Areas of needed future investigation are suggested. (Author)

AD-417 407 Div. 16
(TISTB/AAR) OTS price $15.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
IONIZING RADIATION AND METABOLISM (Ioniziruyushcheye Izlucheniye i Obman Veshchestv),
by L. S. Cherkasova and K. B. Fomichenko.
11 July 63, 221p.
FTD TT62 1575 Unclassified report

Trans. from Izdatel'stvo Akademii Nauk BSSR Minsk, pp. 1-174, 1962.

Descriptors: (*Biochemistry, Radiation effects), (*Metabolism, Radiation effects), Muscles, Liver, Gastrointestinal systems, Nervous system, Radiobiology, Endocrine glands, Tissues (Biology)

The results of the most recent investigations in the field of radiation biochemistry are summarized in this monograph. The major part of the authors' attention is devoted to the change in and disruption of metabolic processes which develop in the central nervous system, the endocrine glands, the gastrointestinal tract, the liver, and the muscles after the action of ionizing radiation on the living organism. (Author)

AD-417 420 Div. 16, 12
(TISTA/VGW) OTS price $1.50

General Electric Co., Philadelphia, Pa.
DESIGN STUDY OF GRAVITY-INDEPENDENT PHOTOSYNTHETIC GAS EXCHANGER,
by Robert G. Newland and Richard W. Price.
June 63, 54p. Rept. no. PIR5753 1437
Contract AF33 657 7410, Proj. 7164, Task 716403
AMRL Rept. no. TDR63 59 Unclassified report

Report on Space Biology Research.

Descriptors: (*Manned spacecraft, Closed-cycle ecological systems), (*Closed-cycle ecological systems, Algae), Photosynthesis, Exchange reactions, Oxidation-reduction reactions, Oxygen, Production, Membranes (Biology), Containers, Design, Tests, Effectiveness, Maintainability, Carbon dioxide, Reduction (Chemistry).

A Photosynthetic Gas Exchanger System utilizing a strain of Chlorella vulgaris algae has been designed and fabricated, and tested for periods up to fourteen days. A maximum oxygen evolution of 1.97 liters per day and carbon dioxide absorption of 1.44 liters per day was achieved during the testing. This capability is provided in a completely closed system which can operate at atmospheric pressures between 7.5 psia and 14.7 psia. The design is capable of gravity independent operation and is adaptable to automatic and semi-automatic operation by regulation of illumination intensity on the algae in response to surrounding chamber oxygen level. The design of the system provides for continuous harvesting of algal cells and maintenance of an adequate nutrient level in the algal solution. The design utilizes a non-wettable, open pore membrane for diffusion of oxygen out of the algal solution and carbon dioxide into solution by partial pressure differences. At the same time, the membrane retains the algal solution within the Photosynthetic Gas Exchanger. The peak power required by the system is 172 watts. The system is mounted on a structure which illustrates a possible subsequent design for flight application. A follow-on program is recommended to perform further development tests to increase the performance of the system and to adapt the system for testing in an orbiting satellite. (Author)

AD-417 501 Div. 16
(TISTB/MS) OTS price $15.50

Lever Brothers Co., Edgewater N. J.
BASIC STUDIES IN PERCUTANEOUS ABSORPTION.
Semi-annual rept. no. 5, Jan-June 63,
ed. by Leonard J. Vinson, Walter R. Koehler, Thomas Masurat and Edward J. Singer. June 63, 221p.
Contract DA18 108CML6573
Unclassified report

Descriptors: (*Absorption, Skin), (*Skin, Absorption), (*Lipids, Skin), Solvent extraction, Diffusion, Water, Chromatographic analysis, Fatty acids, Phospholipids, Tissues (Biology), Penetration, Electron Laboratory animals, Anatomical models, Enzymes, Electron microscopy, Biochemistry.

AD-417 512 Div. 16
(TISTB/AAR) OTS price $3.60

Washington School of Psychiatry, D. C.
CONCEPTS OF ANOSOGNOSIA,
by Edwin A. Weinstein and Malvin Cole. Oct 62, 34p.
Contract DA49 193md2100
Unclassified report

Descriptors: (*Memory, Psychiatry), (*Psychiatry, Memory), Brain, Stimulation, Language, Paralysis, Neurology.

A study of 45 cases of denial of hemiplegia and/or neglect of the affected limbs indicated an alteration of perceptual-symbolic function, in which one side of the body was represented in metaphorical and delusional language and nonverbally in analogous acts and gestures. Delusions and attitudes concerning absence of the affected side were concepts rather than manifestations of failure to receive stimuli. In each case, such alterations in the relationship in the environment were noted by accompanying changes in the designation of place, time, objects and/or person. The predominance of lesions of the right brain is explained by the inability of many patients with left brain lesions and aphasic difficulties to use metaphor, idioms, and synonyms. The etiology is multi-factorial. The brain lesion produces the somatosensory deficit and, in addition, provides the necessary conditions for an altered threshold of interaction in the environment. As both the verbal and non-verbal manifestations are to an extent artefacts of the

situation in which they are observed, responses varied with the conditions of examination. The content of the patterns of anosognosia, as shown, for example, in personification of the affected limbs, can be correlated with pre-morbid social relationships and cultural roles. (Author)

AD-417 513 Div. 16, 30
(TISTB/AAR) OTS price $2.60

Harry Diamond Labs., Washington, D. C.
PROPOSED ACCEPTANCE TEST PROGRAM FOR ARMY ARTIFICIAL HEART PUMP, MODEL 1,
by James W. Joyce, Jr. 2 May 63, 26p.
HDL Proj. 31031
HDL TR1125 Unclassified report

Descriptors: (*Pumps, Mechanical organs), (*Mechanical organs, Pumps), Acceptability, Tests, Army, Quality control, Medical research, Safety devices, Design.

Thirteen preproduction models of the Army Artificialheart Pump, Model 1, were subjected to an acceptance test program designed to insure that the pumps operate as required. Each of the pumps satisfied the requirements set forth as a first approximation. For the frequency-flow-rate tests, the maximum deviations from the group average frequencies and flow rates were 9 cycles per minute and 0.1 liter per minute, respectively. The standard deviations were 5 cycles per minute or less and less than 0.1 liter per minute. In the filling-pressure response tests, the maximum deviations were 7 cycles per minute and 0.2 liter per minute; the standard deviations were 4 cycles per minute or less and under 0.1 liter per minute. It is recommended that the proposed acceptance test program be used to evaluate production models. (Author)

AD-417 522 Div. 16
(TISTB/WA) OTS price $3.60

National Defense Medical Center, Taipei (Taiwan).
STUDIES ON SCHISTOSOMIASIS JAPONICA ON TAIWAN.
Interim rept., 1 Feb-31 July 63,
by O. K. Khaw. 31 July 63, 28p.
Grant DA MD49 193 63G102
Unclassified report

Descriptors: (*Schistosoma, Medical research), (*Medical research, Schistosoma), Parasites, Ecology, Epidemiology, Diagnosis, Disease vectors, Intestine, Statistical data, Immunity.

Attempts were made to find out foci of Schistosoma japonicum infection in the two new areas of Oncomelania formosana prevalence in Ilan and Kaohsiung Hsien (county) by examination of the snail intermediate host, stools of men, and feces of domestic animals and rodents and their internal organs. The results were negative except for the findings of 16 forked-tail cercariae in 314,438 snails (0.f.) and 85 positive reaction for intradermal test with '406' MGL antigen among 1,807 school children, teenagers and peasants. (Author)

AD-417 590 Div. 16
(TISTB/WA) OTS price $2.60

California U., Los Angeles, School of Medicine.
STUDIES OF ADAPTATION OF PROTEIN MALNUTRITION.
Annual progress rept., 1 Dec 62-30 Nov 63,
by Milton E. Rubini. 30 Nov 63, 24p.
Contract DA49 193MD2224
Unclassified report

Descriptors: (*Protein, Nutrition), Adaptation (Physiology), Starvation, Weight, Liver, Intestine, Calcium, Blood proteins, Diet, Dogs, Rats, Army research.

27The rationale and technique of producing a static preparation of chronic protein malnutrition in rats and dogs is reported. The technique employs a period of fasting adjusted to initial weight of the animal and then ''titration'' to a low protein intake adequate in calories to maintain weight at 70-80% of initial weight. Such animals have been observed for over six months. They are normally active and appear well. Studies of such protein deficient animals include: (1) Liver and intenstine mass strikingly reduced while bone growth progresses; (2) Calcium is absorbed more avidly and labile calcium pool is turned over more rapidly; (3) Qualitative and quantitative changes occur in serum proteins with loss of alpha and beta globulins and relative increase in gamma globulins; and (4) Granuloma formation is inhibited. (Author)

AD-417 649 Div. 16
(TISTB/WA) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
RESPIRATORY FUNCTION STUDIES DURING PROLONGED EXPOSURE TO SIMULATED ALTITUDE WITHOUT HYPOXIA,
by Frode Ulvedal, Thomas E. Morgan, Jr., Ralph Garr Cutler, and Billy E. Welch. May 63, 8p.
Task 793002
SAM-B TDR63 31 Unclassified report

Descriptors: (*Respiration, Physiology), High altitude, Spacecraft cabins, Simulation, Controlled atmospheres, Measurement.

This report deals with respiratory function studies (total and timed vital capacity, maximum breathing capacity, and expiratory minute volume) made during several space cabin simulator experiments at ground level and at simulated altitudes of 18,000 feet, 27,000 feet, and 33,500 feet. The duration of the experiments was from 14 to 30 days with a PO sub 2 from normal level to 243 mm. Hg. A reduction in forced vital capacity was noted throughout the experiments at simulated altitude with a prompt reduction at the onset of exposure. Timed vital capacity showed that the percentage of the FVC expired during the first second of effort was greater at 33,500 feet than at ground level with intermediate values at 27,000 feet and 18,000 feet, respectively. An increase in maximum breathing capacity was seen at altitude; the magnitude of the changes appears to be due to the increase in simulated altitude and the decreased density of the respired gas. The expiratory minute volume does not appear to change during exposure to altitude as compared with ground control. (Author)

AD-417 650 Div. 16
(TISTB/WA) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
HUMAN SYMPATHOADRENAL RESPONSIVENESS IN AUTUMN, WINTER, AND SPRING,
by Ralph P. Feller and Henry B. Hale. June 63, 3p.
Task 775801
SAM-B TDR63 46 Unclassified report

Descriptors: (*Adrenal glands, Climatology), Climatology, Metabolism, Physiology, Epinephrine, Smokes, Anxiety, Medical research, Man, Temperature.

By use of urinary catecholamine determinations, sympathoadrenal activity levels were appraised in 231 healthy human subjects over three seasons (autumn, winter, and spring), with the subjects tested at thermoneutrality. Significant variation with season ($P < .01$) was found for epinephrine and norepinephrine output and for the norepinephrine/epinephrine ratio. The latter measure provided the most clear-cut seasonal variation and indicated that sympathoadrenal activity was lowest in autumn, highest in winter, and at an intermediate level in spring. Norepinephrine appears to be the dominant catecholamine in winter. Smokers had higher epinephrine values than did nonsmokers; and when the factor of anxiety was added, it tended to act as an intensifier, bringing out the change in responsiveness in the cooler seasons. (Author)

AD-417 652 Div. 16
(TISTB/WA) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
A SCREENING EXAMINATION FOR DETECTION OF GINGIVAL AND PERIODONTAL BREAKDOWN AND LOCAL IRRITANTS,
by Timothy J. O'leary, William A. Gibson, Jr., Ira L. Shannon, Carlos F. Schuessler and Claude L. Nabers. July 63, 10p.
Task 775602
SAM-B TDR63 51 Unclassified report

Descriptors: (*Dentistry, Medical research), Diseases, Teeth, Mouth, Detection, Training, Dental personnel.

Methods of detecting gingival and periodontal breakdown and periodontal irritants were studied: (1) With a comprehensive periodontal examination used as a criterion, three screening examinations for the detection of periodontal disorders were evaluated. Two systems, the ''mesial'' and the ''mesial plus distal'' proved 94.1 and 98.0 % accurate. (2) By use of the mesial screening system, inter- and intra-examiner consistency between examinations on the same individual was considered. (3) Agreement of the periodontists on scoring disease was checked. (4) General dentists were trained in the use of the mesial screening system and the system for scoring local irritants. After 3 hours of training, six dentists independently assessed 20 subjects on two occasions. With the chief investigator's score used as the criterion, the participating dentists failed to detect advanced gingival or periodontal disease in only 3 of 78 subjects. When failures to refer and wrong referrals were combined, errors by dentist ranged from 10 to 30%. (Author)

AD-417 660 Div. 16
(TISTB/AAR) OTS price $2.60

California U., Berkeley.
(No title).
Technical progress rept. no. 26, 1 Jan-30 June 59.
30 June 59, 551p.
Contracts N7onr29536 and N7onr29540
ONR 0 792 19 Unclassified report

Descriptors: (*Pseudomonas, Scientific research), (*Microorganisms, Scientific research), (*Bacteria, Scientific research), Physiology, Metabolism, Space biology, Detection, Environmental tests, Pasturella, Viruses, Infections, Brucella, Pathology, Immunity, Aerosols, Coccidioides, Antigens and antibodies, Cells, Naval research.

AD-417 665 Div. 16
(TISTB/WA) OTS price $3.60

Stanford Research Inst., Menlo Park, Calif.
FALLOUT NUCLIDE SOLUBILITY, FOLIAGE CONTAMINATION, AND PLANT PART UPTAKE CONTOUR RATIOS,
by Carl F. Miller. July 63, 30p.
SRI Proj. IMU4021
Unclassified report

Descriptors: (*Radioactive fallout, Contamination), Plants (Botany), Physiology, Solubility, Mathematical models, Food, Soils, Absorption (Biological).

Mathematical formulations for fallout nuclide solubility, foliage contamination, and plant part uptake contour ratios are presented for estimating the degree to which various radionuclides in fallout enter the food chains. The nuclide solubility is determined, for the fallout from a land-surface detonation, mainly by the properties of the soil carrier material at the point of detonation and other conditions of detonation. The major parameters which determine foliage contamination are the size of the deposited particles, the foliage surface density, and the fallout deposit level. The type of leaf surface and its orientation are also factors, but the available data are not adequate to resolve the effect of these two factors on the direct contamination of foliage. Very few data are available on the change in foliar contamination with plant size or age for animal crops. (Author)

17. METALLURGY

AD-417 111 Div. 17
(TISTM/AM) OTS price $1.75

Defense Documentation Center, Cameron Station, Alexandria, Va. (22314)
LIQUID METALS, LIQUID METAL ALLOYS AND THEIR APPLICATIONS.
A rept. bibliography,
comp. by Angelo Muccino. Sep 63, 341 refs.
Unclassified report

Descriptors: (*Bibliographies, Liquid metals), (*Liquid metals, Bibliographies), (*Abstracts, Liquid metals), Heat transfer, Thermodynamics, Physical properties, Electrical properties, Corrosion, Hydraulic fluids, Handling, Hazards, Alloys, Fluid mechanics, Mechanical properties, Power, Chemical properties, Coolants, Cooling, Electrochemistry, Design, Handbooks, Lubricants, Lubrication, Seals (Stoppers), Surface properties, Transport properties.

AD-417 137 Div. 17
(TISTM/BRW) OTS price $4.60

IIT Research Inst., Chicago, Ill.
HIGH TEMPERATURE OXIDATION PROTECTIVE COATINGS FOR VANADIUM-BASE ALLOYS.
Final rept., 13 Sep 62-12 Aug 63.
12 Sep 63, 44p. Rept. no. B6001 5
Contract N600 19 59182
Unclassified report

Descriptors: (*Vanadium alloys, Protective treatments), (*Niobium alloys, Protective treatments), Coatings, Metal coatings, Silicon, Nickel, Cobalt, Nickel compounds, Silicon compounds, Cobalt compounds, Processing, Oxidation, Flame spraying, Titanium alloys, Zirconium alloys, Carbon alloys.

Basic pack-siliconizing parameters--time, temperature, activator concentration and location--and edge and surface preparation techniques have been optimized for thin 0.020 to 0.030 inch sheet with respect to static and dynamic oxidation life, coating thickness, and coating adherence during elastic and plastic deformation. Processing for 8 hours at 2150 F with either an isolated or mixed activator-silicon pack yields coatings of optimum thickness, i. e., 2.25 to 3 mils. Static oxidation life of V-60 w/o Cb-1 w/o Ti coated under these conditions is greater than 500 hours at 2200 F. Sixteen other vanadium-columbium base alloys containing various refractory metal additions were pack-siliconized and oxidation tested. (Author)

AD-417 162 Div. 17, 25
(TISTM/AMS) OTS price $1.60

Columbia U., N. Y.
A GENERALIZED THEORY OF STRAIN-RATE-DEPENDENT PLASTIC WAVE PROPAGATION IN BARS,
by Jacob Lubliner. Aug 63, 16p. Technical rept. no. 33; CU3 63
Contract Nonr26686, Proj. NR064 428
Unclassified report

Descriptors: (*Mechanical waves, Metals), (*Metals, Mechanical waves), Stresses, Elasticity, Deformation, Plasticity, Metals, Mathematical analysis, Differential equations, Equations, Loading (Mechanics), Dynamics, Mathematical model, Theory, Relaxation time, Impact shock, Propagation.

A theory of plastic wave propagation in bars is formulated on the basis of a general quasi-linear constitutive equation. It is shown that the ''strain-rate-independent'' and ''strain-rate-dependent'' theories are special cases of the generalized theory, and conditions are shown under which one or the other may be valid. (Author)

AD-417 185 Div. 17, 14
(TISTM/AM) OTS price $8.10

Defense Metals Information Center, Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
comp. by Patricia B. Plate. July 63, 68p.
Contract AF33 616 7747, Proj. 2 8 8975
Unclassified report

Descriptors: (*Bibliographies, Materials), Metals, Alloys, Ceramic materials, Graphite, Cobalt alloys, Nickel alloys, Steels, Stainless steels, Beryllium, Titanium, Magnesium, Silicon, Chromium, Molybdenum, Coatings, Rhenium, Tantalum, Vanadium, Tungsten, Mechanical properties, Welding, Corrosion, Rolling (Metallurgy), Refractory metals and alloys, Niobium.

Contents: High-Strength Alloys--Cobalt base; Nickel base; Engineering steels; Stainless steels; and Iron base. Light Metals--Beryllium; Titanium; Magnesium; and Silicon. Nonmetallics--Carbon, Graphite; Special refractories; and Ceramic oxide. Refractory Metals--Columbium; Chromium; Molybdenum; Rhenium; Tantalum; Vanadium; Tungsten; and Platinum group. Miscellaneous--Coatings; Applications; and Composites.

AD-417 231 Div. 17, 25, 8
(TISTE/CRJ) OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
SIMPLIFIED DETERMINATION OF DIELECTRIC CONSTANTS APPLICABLE TO MICROWAVE ABSORBERS,
by Roger Ringlund, Bruno Beek and Karl Kirk.
June 63, 19p.
Proj. 5546, Task 554603
RADC TDR63 241 Unclassified report

Descriptors: (*Dielectrics, Materials), (*Materials, Dielectric properties), Microwave frequency, Measurement, Test methods, Theory, Functions, Electric fields, Magnetic fields, Absorption, Microwaves.

A process was studied which allows the rapid testing of selected dielectric materials having low loss. This process was evolved by considering the general functions which provide dielectric constant and loss tangent and by making certain acceptable assumptions. The method of measurement required the direct determination of the wavelength existing in the material under test. For selected materials, the validity of this measurement is exemplified and discussed. (Author)

AD-417 237 Div. 17, 4
(TISTM/AMS) OTS price $1.60

IIT Research Inst., Chicago, Ill.
EMBRITTLEMENT OF METALS BY ORGANIC LIQUIDS.
Quarterly rept. no. 3, 1 June-31 Aug 63.
16 Sep 63, 12p. Rept. no. IITRI B183B2 3
Contract DA11ORD022 3108
Unclassified report

Descriptors: (*Steel, Brittleness), (*Metals, Organic compounds), (*Organic compounds, Metals), Alcohols, Exposure, Liquids, Tensile properties, Stresses, Fracture (Mechanics), Loading (Mechanics), Fatigue (Mechanics), Water, Failure (Mechanics), Tests.

It is shown that embrittlement of high-strength steel can be revealed by the use of a deeply and sharply notched specimen in tension-tension fatigue. Test results show a relationship between degree of embrittlement and the length of long chain alcohols. In this series water appears to behave as an alcohol. Moreover, the embrittlement by water is essentially independent of pH and the presence of saline solutes. (Author)

AD-417 253 Div. 17
(TISTM/BRW) OTS price $2.60

Technische Hochschule, Aachen (Germany).
RECRYSTALLIZATION OF SINGLE CRYSTALS.
Final technical rept.,
by Kurt Lucke. Aug 63, 17p.
Contract DA91 591 EUC 2438
Unclassified report

Descriptors: (*Single crystals, Recrystallization), (*Metallic crystals, Crystal growth), Silver, Aluminum, Aluminum alloys, Manganese alloys, Deformation, Nucleation, Heat treatment, Theory, Crystals.

Grain boundary motion in silver bi-crystals obtained by sintering of two single crystals has been studied. The work on growth selection in strained single crystals after artificial nucleation has been continued. Interesting results on Al and Al-Mn alloys and on Ag have been obtained. The theoretical interpretation of these results has been promoted by (1) introduction of quantitative description of the orientation scattering of the crystals obtained by growth selection, (2) by developing a theory of growth selec-

tion in single crystals on a statistical basis and by applying this theory to the above mentioned measurements, and (3) by improving the physical theory of grain boundary motion in the presence of impurity atoms. (Author)

AD-417 413 Div. 17, 26
(TISTM/BRW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE FEASIBILITY OF THE USE OF LIQUID-METAL FUSIONS AS LUBRICANTS,
by A. N. Tynnyy, M. I. Chayevskiy and V. A. Teterskiy. 15 Aug 63, 9p.
FTD TT63 574 Unclassified report

Trans. from Voprosy Mashinovedeniya i Prochnosti v Mashinostroyenii, Izdatel'stvo Akademii Nauk Ukrainskoy SSR, Kiev, 9:8, pp. 41-46, 1962.

Descriptors: (*Liquid metals, Lubricants), (*Bearings, Lubrication), (*Gears, Lubrication), High temperature research, Feasibility studies, Sodium, Lead alloys, Tin alloys, Steel, Friction, Chlorine compounds, Sulfur compounds, Eutectics, Salts, Bismuth alloys, Cadmium alloys.

The use of fusions of low-melting metals as lubricants in sliding bearings and worm reduction gears is proposed in this article. Such use of fusions will enable us to eliminate the special cooling devices used at the present time for cooling friction components in high-temperature installation lubricated with mineral oil, and to considerably increase the efficiency of friction pairs. (Author)

AD-417 469 Div. 17, 14
(TISTM/AMS) OTS price $8.60

Battelle Memorial Inst., Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER, SELECTED ACCESSIONS,
comp. by Mary F. Banks. Aug 63, 73p.
Contract AF33 616 7747, Proj. 2 8 8975
Unclassified report

Descriptors: (*Metals, Abstracts), (*Alloys, Abstracts), (*Abstracts, Metals), (*Bibliographies, Metals), Heat resistant metals and alloys, Refractory metals and alloys, Cobalt alloys, Nickel alloys, Steel, Stainless steel, Iron alloys, Beryllium, Titanium, Magnesium, Silicon, Carbon, Graphite, Refractory materials, Ceramic materials, Oxides, Niobium, Chromium, Molybdenum, Rhenium, Tantalum, Vanadium, Tungsten, Platinum, Coatings, Composite materials.

AD-417 472 Div. 17
(TISTM/AMS) OTS price $4.60

New York U., Coll. of Engineering, N. Y.
DEVELOPMENT OF TOUGH, HIGH STRENGTH ALPHA-BETA TITANIUM-BASE ALLOYS AT 240,000-260,000 PSI YIELD STRENGTH LEVEL.
Quarterly progress rept. no. 3, 25 Dec 62-25 Mar 63,
by P. A. Farrar and H. Margolin. Mar 63, 41p.
Contract DA30 069ORD3690, Proj. 59332008
WAL TR401/300 2 Unclassified report

Descriptors: (*Titanium alloys, Experimental data), Aluminum alloys, Vanadium alloys, Tin alloys, Tensile properties, Iron alloys, Copper alloys, Ductility, Oxygen, Carbon, Nitrogen, Transition temperature, Toughness, Hot working, Zirconium alloys.

In order to develop titanium alloys with 0.1% yield strength in the range 240,000-260,000 psi, a series of 15 eight-pound alloys are being prepared at two interstitial levels. Following their evaluation, 4 fifty-pound alloys will be prepared and tested both as sheet and bar stock. Weldability studies will be performed on the sheet material. Beta transus temperatures have been determined for each of the 30 alloys on 25-gram ingots. Melting and forging of the eight-pound ingots have been completed and machining, heat treating and testing of tensile and impact specimens are in progress. Heat treatment and testing of specimens were completed for seventeen alloys and the data are included in this report. (Author)

AD-417 488 Div. 17
(TISTM/AM) OTS price $1.10

Pennsylvania State U., University Park.
EFFECTS OF TRIAXIAL STRESSES ON MECHANICAL PROPERTIES OF METALS UNDER HIGH PRESSURE.
Final rept., 1 Oct 61-30 Sep 62.
5 Sep 63, 3p.
Grant AF AFOSR62 113
AFOSR 5273 Unclassified report

Descriptors: (*Metals, Mechanical properties), (*Hydrostatic pressure, Stresses), Report, Plasticity, Deformation, Theory, Fatigue (Mechanics), Life expectancy, Test equipment, Damping, Internal friction, Anisotropy.

AD-417 507 Div. 17, 14, 30
(TISTM/AM) OTS price $2.60

General Dynamics, Fort Worth, Tex.
ULTRAHIGH PRESSURE AS A TOOL FOR MOLECULAR ENGINEERING,
by E. Leigh Secrest. 11 Mar 63, 27p. Rept. no. ERR FW192
Contract AF33 657 11214
Unclassified report

Presented at Oklahoma State University, Stillwater, Oklahoma, 11 March 1963, as a part of the Engineering Lecture Series of the Department of Engineering.

Descriptors: (*Materials, Engineering), (*High pressure research, Materials), Phase studies, Graphite, Carbon, Bismuth, Diamonds, Synthesis, Pressure, Resistance (Electrical), Test methods, Test equipment, Silicon compounds, Oxides, Impact shock, Shock waves.

Some of the ways in which ultrahigh pressure (UHP) is being used in materials science laboratories as a tool for molecular engineering are presented. (Author)

AD-417 550 Div. 17
(TISTM/BRW) OTS price $2.60

New York U., N. Y.
A STUDY OF THE FACTORS AFFECTING THE DECOMPOSITION OF THE INTERMEDIATE PHASE GAMMA Ti3Al,
Rept. for 1 Dec 61-31 Jan 63,
by P. A. Farrar and H. Margolin. May 63, 16p.
Contract AF33 657 7684, Proj. 7351, Task 735105
ASD TDR63 325, pt. 1
Unclassified report

Descriptors: (*Titanium alloys, Phase studies), (*Aluminum alloys, Phase studies), (*Intermetallic compounds, Decomposition), Preparation, Rolling (Metallurgy), Heat treat-

ment, Metallography, Microstructure, Zirconium alloys, Copper alloys, Molybdenum alloys, Niobium alloys, Tantalum alloys, Vanadium alloys, Carbon alloys, Silver alloys, Sintering, Melting, Forging.

In order to study the factors effecting the decomposition of the intermediate phase gamma Ti3Al tentative partial isothermal sections at 1000, 850, 700 and 600 C were determined. The effect of certain Beta stabilizers on the decomposition rates was also studied. Uncertainties in the binary Ti-Al system in the range of 7-15% Al are now being studied. Following completion of the phase diagram work, three selected 8 pound ingots will be melted, TTT curves determined and mechanical properties evaluated. (Author)

AD-417 557 Div. 17, 25
(TISTM/BRW) OTS price $11.00

Johns Hopkins U., Baltimore, Md.
REACTION OF FINE METAL WIRES TO IMPOSED LOADS,
by P. W. Kingman, Robert E. Green, Jr., and Robert B. Pond, Sr. Jan 63, 139p.
Contract DA36 034 5090RD3377
Unclassified report

Descriptors: (*Aluminum, Compressive properties), (*Single crystals, Aluminum), Crystal growth, Deformation, Strain (Mechanics), Stresses, Wire.

The application of a constant geometry compression test to single crystals of aluminum of selected diameters from 1/4 to 1/64 in. showed the presence of a diameter-dependent size effect. This size effect was found to be orientation dependent, and it was suggested that the size and orientation dependence were consistent with the predictions of Seeger's theory of work hardening in single slip. Specimens oriented for duplex slip showed a slight size effect on the magnitude but not the shape of the stress-strain curve, except in some cases. (Author)

AD-417 623 Div. 17
(TISTM/BRW) OTS price $2.00

Aerojet-General Corp., Azusa, Calif.
STRESS-CORROSION CRACKING OF HIGH-STRENGTH ALLOYS.
Final rept., 1 July 62-1 June 63,
by R. B. Setterlund. Sep 63, 27p. Rept. no. 2684
Contract DA04 495ORD3069
Unclassified report

Descriptors: (*Steel, Corrosion), (*Titanium alloys, Corrosion), (*Stresses, Corrosion), Fracture (Mechanics), Alloys, Tool steel, Nickel alloys, Aging (Materials), Corrosive gases, Corrosive liquids, Test methods, Humidity, Salts, Environmental tests, Aluminum alloys, Vanadium alloys, Water, Hydrocarbons, Heat treatment, Welds, Cobalt alloys, Theory, Electrochemistry, Rocket cases, Mechanical properties, Protective treatments, Plastic coatings, Fractography, Electron microscopy.

A stress-corrosion-cracking investigation was performed on 1 heat of 20%-nickel maraging steel, 5 heats of 18%-nickel maraging steel, and 6Al-4V titanium alloy. These alloys were tested under three metallurgical conditions: (1) annealed and maraged, (2) cold-reduced and maraged, and (3) welded and maraged. Test environments included aerated distilled water, tap water, and 3% NaCl and 0.25% sodium dichromate solutions, as well as ambient air, 140 F water-saturated air, seacoast atmospheric exposure, hydrocarbon oil, soluble oil-water mixtures and trichoroethylene. Test methods included both two-point loaded beams and tensile-loaded samples having fatigue-crack stress-raisers. (Author)

AD-417 675 Div. 17
(TISTM/REB) OTS price $1.60

MSA Research Corp., Callery, Pa.
FACTORS AFFECTING TH COMPATIBILITY OF LIQUID CESIUM WITH CONTAINMENT METALS.
Quarterly progress rept. no. 4, June-Aug 63,
by F. Tepper and J. Greer. 13 Sep 63, 9p. Rept. no. 63 126
Contract AF33 657 9168
Unclssified report

Descriptors: (*Cesium, Compatibility), (*Corrosive liquids, Cesium), Refractory metals and alloys, Niobium alloys, Zirconium alloys, Molybdenum alloys, Titanium alloys, Liquid metals, Solubility, Corrosion, Reaction kinetics, Boiling.

Work is continuing on investigation of mechanisms associated with the attack of liquid cesium on Haynes-25, columbium-1% zirconium and molybdenum-1/2% titanium. Preliminary evaluations have been performed on the compatibility of TD Nickel, a dispersion alloy, with liquid cesium. Dissimilar metal capsules of Haynes-25 vs Cb-1Zr and Cb-1Zr vs Mo-1/2Ti have been heated in a cesium environment at 1800 F and 2500 F respectively. Solubility studies of the alloys in liquid cesium are underway, utilizing refractory metal crucibles for sampling at temperature. A device for determination of the solubility of carbon in cesium is in the design stage. (Author)

AD-417 692 Div. 17
(TISTM/BRW) OTS price $7.60

Du Pont Metals Center, E. I. Du Pont De Nemours and Co. Inc., Baltimore, Md.
THE DEVELOPMENT OF OPTIMUM MANUFACTURING METHODS FOR COLUMBIUM ALLOY SHEET.
Interim rept. no. 9, 15 Dec 62-15 July 63.
by A. L. Mincher. 31 Aug 63, 62p.
Contract AF33 600 39942, ASD Proj. no. 7 784
Unclassified report

Descriptors: (*Niobium alloys, Manufacturing methods), (*Sheets, Processing), Refractory metals and alloys, Tungsten alloys, Zirconium alloys, Carbon alloys, Mechanical properties, Physical properties, Tensile properties, Stresses, Rupture, Strain (Mechanics), Microstructure, High temperature research, Creep, Melting, Extrusion, Rolling (Metallurgy), Hot working, Cold working, Heat treatment, Aging (Materials).

This report summarizes processing of columbium alloy sheet. Two 8-in.- diameter ingots of D-43 alloy (Cb-10W-1Zr-0.1C, previously designated X-110) have been processed to 24 in. wide sheet panels in three gages, 0.012, 0.018, and 0.030 inches. Details of sheet conversion and evaluation of properties are reported. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-417 104 Div. 18
(TISTB/WA) OTS price $2.60

RAND Corp., Santa Monica, Calif.
ON LOCAL WAR DOCTRINE,

by Malcolm W. Hoag. Aug 61, 26p. Rept. no. P2433

Unclassified report

Descriptors: (*Limited war), Theory, Psychology, Armed Forces (Foreign), Guerrilla warfare, Military strategy, Nuclear weapons.

AD-417 525 Div. 18
(TISTB/AAR) OTS price $2.60

George Washington U., Washington, D. C.
A LOGISTICS PERFORMANCE INDEX,
by W. H. Marlow and W. L. Wilkinson. 13 Aug 63, 22p.
Contracts Nonr76103 and Nonr76105, Projs. NR 345 107 and NR047 001

Unclassified report

Descriptors: (*Logistics, Effectiveness), Operation, Mathematical analysis, Submarines.

Identifiers: 1963, Performance index, Deployment, Linear weights.

This paper introduces a simple performance index for use as a 'figure of merit' or 'over-all measure of effectiveness' for particular means of accomplishing a given operation. A special linear form of the general index is developed in detail and its application is illustrated for two cases: transportation to support overseas deployments and submarine repair parts inventory problems. (Author)

AD-417 764 Div. 18
(TISTM/BRW) OTS price $9.60

Dunlap and Associates Inc., Stamford, Conn.
A STUDY OF PROCUREMENT COSTS AT THE SHIPS PARTS CONTROL CENTER. VOLUME I. CONCEPTS, METHODOLOGY, AND RESULTS.
31 July 61, 104p.
Contract Nonr2860 00

Unclassified report

Descriptors: (*Naval procurement, Costs), (*Logistics, Naval research), Theory, Data, Numerical analysis, Mathematical prediction, Mathematical models.

This project is part of the applied research program in logistics of the Bureau of Supplies and Accounts, Department of the Navy. Its purpose is to develop cost theory and data required by existing and foreseeable procurement, inventory control, and logistic system management decision rules for the Navy supply system. Phase B of the project is concerned with procurement costs at the Ships Parts Control Center. Predictive cost functions (models) are developed which distinguish between various types of purchase action (e.g., purchase orders, advertised contracts, etc.), sources of workload input (e.g., reviews of system stocks, requisitions from the fleet, etc.), and internal processing procedures. (Author)

AD-417 797 Div. 18, 32
(TISTB/WA) OTS price $1.60

American U., Washington, D. C.
A PRELIMINARY BIBLIOGRAPHY ON STUDIES OF THE ROLES OF MILITARY ESTABLISHMENTS IN DEVELOPING NATIONS,
by Peter B. Riddleberger. 10 July 63, 12p.

Unclassified report

Descriptors: (*Military organizations, Bibliographies), (*Bibliographies, Military organizations), Military government, Political science, Military facilities, Warfare, Operations research, Economics.

This report contains an initial bibliographic listing of unclassified studies of the roles--primarily non-external-defense roles--of military establishments in developing nations. The listing is restricted to studies in the English language, published primarily since World War II, which were identified in an initial survey of the literature. This survey was limited to those studies which directly treat the topic of military roles--either as the primary focus of the study, or as a major part of a broader, or differently focused, study. Some studies concern themselves with the direct impact, formal or informal, of the military institution, or military personnel, on the political, economic, and social institutions and functions of the society. Others are more concerned with the indirect, informal influence of military personnel on various aspects of societal life. (Author)

19. NAVIGATION

AD-417 195 Div. 19, 8
(TISTA/FRL) OTS price $3.00

Vitro Labs., Silver Spring, Md.
CORRELATION OF OPERATIONAL RELIABILITY WITH INHERENT RELIABILITY OF AIRBORNE TACAN EQUIPMENT.
Final rept., 4 Nov 60-3 Feb 62,
by James W. Thomas. Nov 62, 148p.
Contract AF33 600 42323
ASD TDR62 839 Unclassified report

Descriptors: (*Radio navigation, Airborne), Reliability, Factories, Maintainability, Ultrahigh frequency, Tests, Failure (Mechanics), Operation, Electronic equipment, Maintenance, Reliability (Electronics), Radio beacons.

This study provides a correlation between the operational reliability of airborne electronic equipment and the inherent reliability of the same equipment demonstrated in the manufacturer's plant. The airborne portion of a short range navigation system known as TACAN was the subject equipment in the study. Operational reliability was determined from results of a controlled field test of TACAN units installed in fighter-interceptor aircraft. Inherent reliability was determined from results of Factory Advisory Group for Reliability of Electronic Equipment (AGREE) tests required by contract to demonstrate adherence to a specific numerical reliability requirement. Contributing factors to differences between factory AGREE reliability and field reliability are examined in detail to provide a basis for assessing the application of AGREE procedures as a means for obtaining reliable electronic equipment in the end use environment. Additional aspects investigated were equipment maintainability and availability, failure reporting procedures, use of elapsed time indicators, and field resources required for TACAN maintenance. (Author)

AD-417 680 Div. 19, 33
(TISTA/LSK) OTS price $10.10

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
INFORMATION DISPLAY IN THE AIR TRAFFIC CONTROL

SYSTEM. A COORDINATED RESEARCH AND DEVELOPMENT APPROACH,
by Edward P. Buckley and Thomas H. Green.
12 Mar 62, 1v.
Contract FAA BRD423
Unclassified report

Original contains color plates: all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Air traffic control systems, Display systems), (*Display systems, Human engineering), (*Air traffic controllers, Decision making), Job analysis, Automation, Communication theory, Statistical analysis.

This paper presents a plan of attack on the problem of displays for use in advanced air traffic control systems. The method, known as CODE ('Controller Decision Evaluation'), consists of the experimental comparison of display information and formats under conditions of scoreable static simulations. The experimental displays are simulations of radar scopes projected from film strips for multiple viewing. Independent variables are the type, amount, and/or level of detail of information presented to the controller; dependent variables are success in predicting conflictions and/or delays. The technique makes it possible to assess the effectiveness of ATC Systems which as yet are only visualized, as well as of systems now being developed or in actual operation. Two experiments are reported utilizing the method. An experimental program is presented to study the effects of progressively advanced degrees of automated information processing upon controller decision-making. A matrix is presented showing the steps to be taken for the orderly development of a fully automated system. The CODE experiments to be performed prior to the development of each level of automation, as indicated in the matrix, are discussed. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-417 148 Div. 20
(TISTP/FEM) OTS price $3.60

Paris U. (France).
THEORETICAL STUDY OF PARTICLE POLARIZATION IN HIGH ENERGY PHYSICS,
by Louis Michel. 1962, 33p.
Contract AF61 052 474
AFOSR Rept. no. 5287 Unclassified report

Descriptors: (*Nuclear particles, Momentum), (*Polarization, Particles), Scattering, Nuclear physics, Nuclear scattering, Nuclear spins, Quantum mechanics, Transformations (Mathematics), Energy, Operators (Mathematics), Algebras, Matrix algebra, Decay schemes, Nuclear cross sections, Hyperons, Baryons, Mesons.

Covariant description of particles polarization is explained from the foundation of quantum theory and relativistic invariance. Several applications in High Energy Physics are presented. (Author)

AD-417 228 Div. 20
(TISTM/EJH) OTS price $5.60

Kansas U., Lawrence.
RESONANCES IN YIELD CURVE OF THE SI-30(PROTON, GAMMA)P-31 REACTION (E SUB P = 1.5 TO 3.0 MEV RANGE),
by Richard M. Roberds. July 63, 44p.
Unclassified report

Master's thesis.

Descriptors: (*Nuclear energy levels, Gamma proton reaction), (*Gamma proton reaction, Radioactive isotopes), (*Silicon, Gamma proton reaction), (*Phosphorus, Gamma proton reaction), Proton bombardment, Radioactive isotopes, Gamma rays, Proton beams, Radioactive decay, Nuclear magnetic resonance, Excitation.

This study was concerned with proton energies between 1.5 and 3.0 Mev and is intended to be an extension of experimental work done previously in this laboratory. It was performed to provide the basis for further investigation of the excited states of p-31. The reaction Si-30 (p, gamma)p-31 within the range of proton energies 1.5 to 3.0 Mev has been studied by several authors but, the range was covered completely only by Barnard et al. Using an enriched Si-30 target approximately 7 kev thick and incident proton energies from 1.0 to 4.25 Mev, Barnard et al. found 46 resonances over the range covered in this study. However, because of the inherent nature of p-31 to display groups of closely spaced resonance levels, it was felt that the experimental results of Barnard et al. might not have resolved all the existing resonance levels. The data obtained in this work show that this feeling was justified to an extent far beyond intuitive expectations. (Author)

AD-417 240 Div. 20
(TISTB/WA) OTS price $8.10

Engineering-Science Inc., Pasadena, Calif.
THE RECOVERY AND RESTORATION OF METROPOLITAN WATER WORKS FOLLOWING NUCLEAR WAR ATTACK.
May 63, 147p.
Contract OCD OS62 106
AEC NP 12902 Unclassified report

Descriptors: (*Nuclear explosion damage, Water supplies), (*Water supplies, Recovery), Civil defense systems, Vulnerability, Radioactive fallout, Contamination, Storage, Urban areas, Thermal radiation, Blast, Personnel, Nuclear warfare.

The emergency water needs in a post attack period were studied. Procedures for the development of inventories of auxiliary supplies showing the possible sources of supply together with methods of distribution were studied. The many activities and measures that will lessen the effect of the forces of destruction and increase the capability for recovery that have been considered in this study are presented as an aid in the training of personnel and the development of a state of readiness. (Author)

AD-417 241 Div. 20
(TISTM/AM) OTS price $3.60

Utah U., Salt Lake City.
MUON CAPTURE IN CHEMICAL COMPOUNDS,
by Roy Eugene Herman. Aug 63, 29p.
Unclassified report

Master's thesis.

Descriptors: (*Meson capture, Chemical compounds), Oxides, Silicon compounds, Phosphorus compounds, Probability, Test equipment, Test method, Cosmic rays, Statistical analysis, Digital computers, Programming (Languages).

The purpose of the present experiment was to investigate the law governing the probability that a muon should come to rest on a particular atom in a chemical compound. For this purpose, two true binary compounds were used: SiO2 and

P205. The apparatus used in this experiment was the same as used by Neilsen (1962), Jacob (1963) and Wakitsch (1963). The results were:

O/P	2.82 ± 0.45
O/Si	2.24 ± 0.38

The results were in agreement with the stoichiometric ratios of the compounds. (Author)

AD-417 251 Div. 20, 14, 4, 17, 32
(TISTM/TCG) OTS price $2.60

Radiation Effects Information Center, Columbus, Ohio.
RADIATION EFFECTS INFORMATION CENTER. MONTHLY ACCESSION LIST ABSTRACTS, PART I.
15 Sep 63, 27p. REIC Accession List 67
Contract AF33 657 10085
Unclassified report

Descriptors: (*Abstracts, Materials), (*Radiation damage, Materials), (*Materials, Radiation damage), Space environmental conditions, Ceramic materials, Polymers, Plastics, Inorganic compounds, Organic compounds, Electronic equipment, Metals, Alloys, Steel.

AD-417 282 Div. 20
(TISTP/FEM) OTS price $4.60

General Dynamics, Fort Worth, Tex.
A SYSTEMIZATION AND PENETRATION STUDY FOR STRAIGHT CYLINDRICAL DUCTS,
by D. G. Collins and L. W. McCleary. 31 May 63, 45p. Document no. NARF63 3T; FZK9 182
Contract AF33 657 7201
Unclassified report

Descriptors: (*Ducts, Cylindrical bodies), (*Neutron beams, Ducted bodies), Experimental data, Aluminum, Fast neutrons, Neutron detectors, Polonium, Beryllium, Sources, Neutrons, Neutron scattering, Dose rate, Shielding, Water, Monte Carlo method, Neutron transport theory, Mathematical analysis, Isotropism, Ducted bends, Neutron flux, Penetration.

A study was conducted to determine the effect that varying the length and diameter of a straight cylindrical duct has on the neutron radiation streaming through the duct. An experiment was set up in which a polonium-beryllium source was located on centerline in the mouth of an aluminum duct penetrating a water slab. The resulting data were analyzed by use of two Monte Carlo procedures developed to analyze radiation streaming through cylindrical ducts. Results of additional calculations are shown to indicate the possibility of extending the experimental findings to duct problems involving different source energy and angular distributions and different shielding materials. (Author)

AD-417 324 Div. 20
(TISTP/HG) OTS price $3.60

Pittsburgh U., Pa.
AFTERGLOW ATOMIC COLLISION PROCESSES,
by Manfred A. Biondi. 20 Aug 63, 34p. Technical rept. no. 1; Rept. no. 3
Contract Nonr62406
Unclassified report

Descriptors: (*Phosphorescence, Gas ionization), Excitation, Atoms, Ions, Electrons, Gases, Microwaves, Microwave frequency, Absorption, Scattering, Diffusion, Electron density, Decay schemes, Recombination reactions, Molecules, Partial differential equations, Equations, Gas discharges, Discharge tubes.

Reviews briefly the information concerning atomic collisions involving electrons, ions, excited atoms, and normal atoms at near-thermal energies which has been obtained from afterglow studies, that is, from the study of the behavior of an ionized gas following the removal of external ionizing agents. Describes briefly some of the principal techniques which have been used in afterglow investigations, then discusses the classes of atomic collision processes which have been successfully studied by these methods, and finally chooses representative examples to illustrate the scope of the atomic collision measurements. (Author)

AD-417 328 Div. 20
(TISTP/FDR) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
REPORT OF FOREIGN VISIT TO UNITED KINGDOM, 22-26 JULY 1963,
by James O. Porteus. 16 Aug 63, 19p.
Unclassified report

Descriptors: (*Elastic scattering, Argon), (*Electrons, Elastic scattering), Inelastic scattering, Energy, Electron beams, Diffusion pumps, Ionization gages, Electron diffraction analysis, Gas flow, Integral equations, Measurement, Atoms.

The differential elastic scattering of electrons by argon gas has been investigated in the energy range 75 to 500 eV at angles of 4 to 160 degrees. The inelastic scattering has also been investigated at angles of 4 to 10 degrees from the forward direction. Electron energies measured by the retarding field method were differentiated and corrected for energy spread of the incident beam by an optimized method. Results are compared with other measurements and with recent calculations. (Author)

AD-417 349 Div. 20
(TISTP/HG) OTS price $2.60

Washington U., Seattle.
EXPERIMENTAL STUDIES IN NUCLEAR PHYSICS.
Final rept., 1 Aug 62-30 June 63,
by Franklin B. Shull, J. M. Fowler, J. B. Reynolds, R. Wilson and C. Hohenemser.
30 June 63, 1v.
Grant AFOSR62 428
AFOSR 5284 Unclassified report

Descriptors: (*Mossbauer effect, Tin), (*Differential cross section, Nuclear reactions), Cyclotrons, Gamma rays, Resonance scattering, Crystal lattice, Absorption, Deutron bombardment, Alpha particles, Nuclei, Neutrons, Protons, Polarization, Nuclear shell models, Mathematical models, Nuclear physics.

Research activities and accomplishments are reported in two major sections. The first deals with the scientific accomplishments, and is necessarily somewhat brief because the cyclotron was out of operation and being remodelled throughout the period of research; it consists of a report of a study of the Mossbauer effect in beta-tin over the temperature range from 1.3 to 370 degrees Kelvin, which did not require cyclotron operation for its continuation and a report of the analysis of differential cross-sections of several (d, alpha) reactions. The second section reports on the progress of the cyclotron redevelopment program and describes current operations and projections for the near future. (Author)

AD-417 416 Div. 20, 16
(TISTB/AAR) OTS price $1.10

Biomedical Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
RADIOMETRIC MEASUREMENT OF SKIN TEMPERATURE

CHANGES DURING SIMULATED NUCLEAR THERMAL RADIATION,
by W. C. Kaufman and J. C. Pittman. July 63, 8p.
AMRL Memo. no. M47 Unclassified report

Descriptors: (*Thermal radiation, Radiation effects), (*Radiation effects, Skin), Measurement, Temperature, Simulation, Burns, Infrared radiation, Intensity, Tolerances (Physiology), Nuclear explosions.

Aircrew members delivering nuclear devices may be exposed to dangerous intensities of thermal radiation even though their cockpit is not oriented directly toward the detonation. Since accuracy of delivery may be inversely related to distance from the target it is important to determine the nearest safe distance from the detonation. Tolerable intensities were determined first in a static fighter-bomber, but in those experiments the method prevented valid measurement of subjects' skin temperature in critical areas. A radiometer was designed and constructed using a lead telluride sensor, a mirror optical system, and a germanium optical filter. Nuclear thermal radiation was simulated with 18 heat lamps providing intensities, at the subject. A plexiglass optical filter simulated the aircraft canopy. Five subjects reported painfully hot sensations at skin temperatures of 105-109 degrees F caused by thermal energies. True pain was reported at 112-116 degrees F. Radiometric measurement of these temperatures in no way affected the thermal characteristics or response of the subjects. Temperatures were validated by subdermal thermocouple measurements in 4 experiments. Determination of the responses of 88 subjects gave statistically valid results. The responses of 6 negro subjects showed the importance of the filtering capabilities of plexiglass canopies as they are related to spectral characteristics of human skin. (Author)

AD-417 493 Div. 20, 25
(TISTP/WH) OTS price $1.60

Sydney U. (Australia).
(No title).
Technical final rept., 1 July 62-30 June 63.
July 63, 13p.
Grant AF AFOSR62 410
AFOSR Rept. no. 5282 Unclassified report

Descriptors: (*Cosmic rays, Upper atmosphere), (*Radiation measurement systems, Cosmic rays), (*Photographic emulsion, Cosmic rays), Cosmic ray bursts, Protons, Mesons, Electron density, Nuclear scattering.

A study of high energy nuclear interactions was made using a 20 litre block of nuclear research emulsion flown to 115,000 ft for 6 1/2 hours over Holloman A.F.B., New Mexico, an array of 64 large plastic scintillators, 600 G.M. counters and four Wilson Cloud Chambers in Sydney, Australia and two Wilson Cloud Chambers on Sulphur Mountain, Alberta, Canada. (Author)

AD-417 494 Div. 20
(TISTP/FR) OTS price $3.60

Defense Atomic Support Agency, Washington, D. C.
LIST OF MILITARY AND CIVIL DEFENSE RADIAC DEVICES, 1963.
1963, 31p.
DASA Rept. no. 1243, rev.
Unclassified report

Descriptors: (*Radiation measurement systems, Catalogs), Alpha counters, Gamma counters, Neutron detectors, Dosimeters.

Contents--Rate Meters - Low-range survey meters, High-range survey meters, Alpha detectors, Neutron detectors, Special-purpose rate meters, Training devices; Dosimeters - Self-indicating dosimeters, Non-self-indicating dosimeters, Alarm-type dosimeters, Dosimeter chargers and readers; Miscellaneous Radiac Equipment - Calibration sources, Special-purpose equipment; Research and Development Items - Survey meters, Dosimetry, Special-purpose meters, Miscellaneous; Supplementary Information - Definition of usage classification, Organizational abbreviations.

AD-417 502 Div. 20, 7, 13
(TISTB/MS) OTS price $15.00

Advance Research, Inc., Cleveland, Ohio.
CRITICAL INDUSTRY REPAIR ANALYSIS. ELECTRIC POWER.
Final rept.,
ed. by Randle H. Powley. 1962, 1v.
Contract OCD OS 62 257
Unclassified report

Descriptors: (*Power plants (Establishments), Nuclear explosion damage), (*Nuclear explosion damage, Control), Vulnerability.

In general, the vulnerability studies indicate that the critical blast-damage levels for the hydroelectric facilities would be higher than those for the steam plant. Similarly, fallout hazards would be less serious at the hydroelectric plant than at the steam plant. Thermal radiation is not a major structural factor at any of the plants under consideration. The plant studies agree that production at most facilities would be interrupted by flying glass at blast overpressures within the range of 0.1 to 1.0 psi. (Author)

AD-417 577 Div. 20
(TISTP/WH) OTS price $3.60

Naval Radiological Defense Lab., San Francisco, Calif.
RESIDUAL RADIOACTIVITY FOLLOWING CYCLOTRON SHUTDOWN,
by C. Sharp Cook. 20 Aug 63, 38p.
Task 1601
NRDL Rept. no. TR667 Unclassified report

Descriptors: (*Cyclotrons, Radioactivity), (*Radioactivity, Cyclotrons), Neutron reactions, Gamma rays, Scattering, Ion beams.

This report reviews the physical interactions through which residual radioactivity can be developed in the shielding vault of the NRDL 70-inch AVF cyclotron and discusses in general terms the design characteristics that affect the magnitude of the ultimate residual radiation field that will be found. By comparison with measurements at other cyclotrons, estimates of the expected maximum residual gamma-radiation fields are reported. From the results it appears that, under certain conditions of operation of the NRDL cyclotron, residual radiation fields after shutdown may possibly present a serious hazard, but it should be possible, through careful design of specific parts of the cyclotron, to keep the magnitude of this radiation below hazardous levels. (Author)

AD-417 580 Div. 20
(TISTP/FR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SCINTILLATION COUNTER FOR GAMMA DEFECTOSCOPY.

Division 21 - NUCLEAR PROPULSION
Division 22 - ORDNANCE

30 July 63, 2p.
FTD TT63 696 Unclassified report

Trans. from Stsintillyatsionnyy Schetchik Dlya Gamma-Defektoskopii, p. 1, 1960.

Descriptors: (*Scintillation counters, Gamma rays). Gamma rays, Materials, Manufacturing methods.

AD-417 695 Div. 20, 15
(TISTP/HG) OTS price $1.60

Theoretical Chemistry Inst., U. of Wisconsin, Madison.
THE SUDDEN APPROXIMATION APPLIED TO ROTATIONAL EXCITATION OF MOLECULES BY ATOMS. I. LOW ANGLE SCATTERING,
by K. H. Kramer and R. B. Bernstein. 12 Aug 63, 13p. Rept. no. WIS TCI31
Unclassified report

Descriptors: (*Diatomic molecules, Excitation), (*Nuclear scattering, Diatomic molecules), Molecular rotation, Phase studies, Differential cross sections, Inelastic scattering, Perturbation theory, Probability, Atoms, Particle trajectories, Selection rules, Numerical analysis, Integral equations, Momentum, Integration, Time, Tables.

The sudden approximation is applied to the calculation of transition probabilities and cross sections for rotational excitation and scattering of homonuclear diatomic molecules by atoms. The present analysis is restricted to a consideration of the influence of the anisotropy and strength of the long-range attractive part of the interaction potential only; its applicability is thus limited to the low angle scattering problem. Nevertheless, the results illustrate the main features of the method applied to inelastic molecular collisions in general, and demonstrate its advantage over the first-order perturbation approximation. Low angle differential inelastic scattering cross sections would yield directly the anisotropy of the long-range attractive potential. (Author)

AD-417 704 Div. 20
(TISTP/HG) OTS price $8.10

General Dynamics, Fort Worth, Tex.
NEUTRON CROSS SECTIONS FOR NITROGEN AND OXYGEN,
by R. L. Kloster and M. B. Wells. 31 May 63, 97p. Rept. no. NARF62 17T; MR N298
Contract AF33 657 7201
Unclassified report

Descriptors: (*Oxygen, Neutron cross sections), (*Nitrogen, Neutron cross sections), Shielding, Transport properties, Elastic scattering, Inelastic scattering, Fast neutrons, Differential cross sections, Nuclear energy levels, Neutron scattering, Neutron reactions, Neutron capture, Gamma ray cross sections, Neutron absorption, Nuclear cross sections, Special functions, Tables, Data.

Neutron cross sections for nitrogen and oxygen that are of primary interest in shielding and transport calculations are compiled in this report. Cross sections for the following processes are compiled for both oxygen and nitrogen: total, elastic scattering, nonelastic collisions, inelastic scattering, differential elastic scattering, (n, alpha) reactions, (n,p) reaction, and (n,d) reaction. The following cross sections are compiled for nitrogen only: gamma-ray production, (n,t) reaction, (n,2n) reaction, and (n,2 alpha) reaction. Cross sections of nitrogen for excitation of the various levels of the residual nucleus in the (n, alpha j), and (n,n'j) reactions are also compiled. (Author)

21. NUCLEAR PROPULSION

AD-417 109 Div. 21
(TISTM/ODN) OTS price $3.60

General Electric Co., Cincinnati, Ohio.
DEVELOPMENT STUDY OF CLAD HYDRIDED ZIRCONIUM AS SOLID MODERATOR,
by Coy L. Huffine. 14 June 57, 35p. Rept. no. APEX307
Contract AF33 038 21102
Unclassified report

Descriptors: (*Reactor moderators, Materials), Zirconium alloys, Physical properties, Cladding, Thermal conductivity, Thermal expansion, Hardness, Density, Electrical conductance, Tests, Nuclear propulsion, Hydrides, Reactor materials, Solids.

A summary of the present (as of original writing of this report - January 1956) knowledge on the use of clad hydrided zirconium as a solid moderator is presented. Physical property data are compiled, and information in regard to cladding and evaluation testing of clad sections is summarized. (Author)

22. ORDNANCE

AD-417 160 Div. 22
(TISTM/AMS) OTS price $1.60

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
FEASIBILITY STUDY OF AIR DASHPOT FOR DELAYED ARMING OF M52A2 PD FUZE,
by Lester Griffin. Sep 63, 9p.
PA Technical memo. no. 1257
Unclassified report

Descriptors: (*Arming devices, Point detonating fuzes), (*Point detonating fuzes, Arming devices), Ballistics, Delay elements (Explosive), Porous materials, Fuzes (Ordnance), Feasibility studies.

A program was initiated by Picatinny Arsenal to redesign the air dashpot mechanism for delayed arming of the M52A2 PD Fuze. A delay device utilizing the principles of bleeding air through a porous restrictor was adapted into the fuze. A workable unit was evolved which showed satisfactory static and ballistic test results. As a result of tests conducted, mechanism appeared completely feasible and was recommended for further development. (Author)

AD-417 197 Div. 22
(TISTW/AW) OTS price $2.60

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
PREPRODUCTION TESTING OF THE FAIREY AVIATION MN-1A PRACTICE BOMB DISPENSER,
by Lee W. Short. July 63, 18p.
Proj. ESP921X0000 021500A
AFSWC TDR63 62 Unclassified report

Descriptors: (*Bomb carriers, Design), (*Bomb ejectors, Environmental test), Military requirements, Bombs, Training ammunition, Ejectors (Ordnance), Bomb auxillary equipment, Aerial mines, Fuzes (Ordnance), Mine fuzes, Vibration, Altitude chambers, Low temperature research, Salt spray tests, Acceleration, Humidity, Desert test, Shock (Mechanics), Thermal stresses.

Testing of the Fairey Aviation Corporation MN-1A Trainers was performed by AFSWC at the request of the Royal Canadian Air Force, for the purpose of establishing the Fairey Aviation Corporation as a qualified producer of the MN-1A Trainer. The tests were made in general accordance with Mil-T-25812A and Mil-E-5272C, and included vibration, acceleration, and shock testing, and exposure to certain climatic conditions critical to the operation of the dispensers. Three sample trainers, numbered FAC-1, FAC-2, and FAC-3, were used. To expedite testing, each of the samples was subjected to a portion of the specified test requirements. The tests indicated a need for a number of improvements in the original design. (Author)

AD-417 229 Div. 22, 25, 8
(TISTP/MH) OTS price $7.60

Polytechnic Inst. of Brooklyn, N. Y.
PRELIMINARY EXPERIMENTAL INVESTIGATION OF THE IONIZED GAS IN FRONT AND BEHIND A HIGH VELOCITY SHOCK IN ARGON,
by Samuel Lederman. Aug 63, 62p.
Contract AF30 602 3003, Proj. 5561, Task 556114
RADC TDR63 267 Unclassified report

Descriptors: (*Gas ionization, Shock waves), (*Shock waves, Gas ionization), Shock tubes, Shock, Velocity, Microwaves, Measurement, Waveguides, Resonance, Electrostatics, Electric potential, Argon.

This report presents the preliminary results of an experimental investigation of electromagnetic properties of an ionized gas induced by a shock wave in a shock tube. The shock velocity has been measured using a microwave technique based on the resonant properties of the tube as a waveguide. Electrostatic measurements have been conducted in the ionized gas; they show that the ionized gas becomes positively charged with respect to the wall of the tube. (Author)

AD-417 423 Div. 22
(TISTP/AW) OTS price $3.60

General Electric Co., Burlington, Vt.
PROJECT VULCAN RESEARCH AND DEVELOPMENT.
Progress rept. no. 40, 1 Apr-31 May 63.
31 July 63, 1v. Rept. no. 63APB42
Contract DA19 020ORD5455
Unclassified report

Descriptors: (*Aircraft guns, Tests), Automatic weapons, Jet fighters, Gun components, Springs, Screw threads, Bolts, Life expectancy, Materials, Cams.

Research and development on the M61 Vulcan Gun is reported. The following projects and studies are discussed: gun gas drive, gun gas drive spring starter, unlock cams, front track bolts, and range firing records. (Author)

AD-417 515 Div. 22
(TISTP/AW) OTS price $4.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
DIRECTIONAL EFFECT OF CHARGE MOTION ON SHOCK FORMATION AT A SPHERICAL PENTOLITE CHARGE,
by Henry J. Goodman. June 63, 56p.
Proj. 1M010501A006
BRL Rept. no. 1206 Unclassified report

Descriptors: (*Shock waves, Detonations), (*Explosions, Shock waves), Charges (Explosive), Pentolite, Exterior ballistics, Spheres, Hypersonic flow, Blast, Propagation, Mathematical analysis.

The peak pressure at interaction of the explosive and ballistic shock in the direction of charge motion is estimated from hydrodynamic theory. Approximations to the flow conditions and shock propagation along this direction are made. The increase in peak pressure at the forward point of the ballistic shock varies from about 30% at charge velocity Mach 1.5 to about 150% at Mach 10. Comparison of differing approximations indicates that the major part of the increase results from pressure and entropy change within the ballistic shock rather than from the air flow about the charge. (Author)

AD-417 659 Div. 22, 20
(TISTM/AMS) OTS price $.50

Lawrence Radiation Lab., Livermore, Calif.
PROJECT PRE-BUGGY SCOPE OF CHEMICAL EXPLOSIVE CRATERING EXPERIMENT,
by E. Graves, W. R. Wray and R. B. Pierce.
15 May 63, 50p.
AEC PNE300 Unclassified report

Preliminary report on Plowshare.

Descriptors: (*Cratering, Explosions), (*Explosions, Cratering), Safety, Detonations, Tracer studies, Radioactivity, Photographs, Explosion effects, Desert tests, Nuclear industrial applications, Ventilation.

This report provides a general description of the PRE-BUGGY CHEMICAL EXPLOSIVE EXPERIMENTS. These experiments consisted of a series of single- and multiple-change detonations designed to refine our knowledge of channel size as a function of charge spacing, and to obtain data on venting of explosion products from a row of spherical charges detonated in alluvium. A basic series of six single-charge detonations and four multiple-charge detonations of five charges in a row was executed in Area 5 of the Nevada Test Site from November 1962 through February 1963. Each charge contained 1,000 pounds of nitromethane with a La-140 tracer. (Author)

Division 23 - PERSONNEL AND TRAINING
Division 24 - PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

23. PERSONNEL AND TRAINING

AD-417 183 Div. 23, 28
(TISTA/LSK) OTS price $2.25

Aeronca Mfg., Corp., Baltimore, Md.
TRAINING AND TRAINING EQUIPMENT REQUIREMENTS FOR GROUND OPERATOR AND MAINTENANCE PERSONNEL OF ADVANCED SPACE SYSTEMS,
by Peter A. Castruccio, Harry L. Loats, Jr., and John A. Modrick. July 63, 83p.
Contract AF33 616 6907, Proj. 6114, Task 611403
AMRL TDR63 67 Unclassified report

Report on Training Equipment, Simulators and Techniques for Air Force Systems.

Descriptors: (*Astronauts, Training), (*Maintenance personnel, Training), Training devices, Military training, Space flight, Space stations, Flight simulators, Lunar craft, Job analysis, Military requirements, Ground support equipment, Checkout procedures, Aviation personnel, Guided missile personnel.

Training requirements for ground operator and maintenance personnel of manned space systems of the 1960-1975 era are examined. Hypothetical models for an earth orbital and a lunar vehicle are formulated from an analysis of space missions proposed by NASA and USAF as of July 1962. Probable components and characteristics of major facilities and vehicular subsystems are described; this material is based on an analysis of mission requirements and a projection of engineering technology over the time span of the study. (Author)

AD-417 417 Div. 23
(TISTB/WA) OTS price $2.60

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
THE CHECKOUT AND MAINTENANCE (CAM) TRAINER. II. DESCRIPTION AND FUNCTIONAL CHARACTERISTICS,
by Eugene R. Hall, John A. Modrick, Paul R. Richard and John L. Moss. July 63, 25p.
Proj. 1710, Task 171004
AMRL Memo. no. P51 Unclassified report

Descriptors: (*Training devices, Maintenance equipment), (*Checkout equipment, Training devices), Electronics, Maintenance personnel, Maintenance equipment, Training, Scientific research, Radar equipment, Simulation, Integration, Checkout equipment.

In cooperation with Lockheed Electronics Co., Contract AF33 616 7584. Report on Training, Personnel and Psychological Stress Aspects of Bioastronautics.

The Checkout and Maintenance (CAM) Trainer is a major device specially constructed for research on electronic maintenance. The device was designed to support research on problems such as: determining the major sources of difficulty in electronic maintenance, specifying the most efficient techniques and devices for training and aiding electronic maintenance personnel, and developing effective techniques for evaluating the proficiency of personnel performing electronic maintenance. The major components of the CAM Trainer are an operational AN/ASB-4 radar system, a student console teaching device for presenting information relevant to the operation of the ASB-4 system, an experimenter's station for recording data and controlling the operation of the student console, and special malfunction generation equipment for inserting controlled malfunctions into the ASB-4 system. This report describes the major components of the CAM Trainer, their interrelationships and functional characteristics. Schematic diagrams relevant to the Trainer are also presented. (Author)

AD-417 456 Div. 23, 28
(TISTB/WA) OTS price $1.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
A PRELIMINARY STUDY OF OFFICER JOB EVALUATION FACTORS,
by Joseph M. Madden. May 63, 11p.
Proj. 7734, Task 773402
PRL TDR63 14 Unclassified report

Descriptors: (*Officer personnel, Job analysis), (*Job analysis, Officer personnel), Psychometrics, Statistical analysis, Military requirements, Mathematical prediction, Air Force, Measure theory.

A criterion was developed for validating proposed job requirement factors by pair-comparison scaling of 31 officer specialties. Comparisons were collected by a multiple rank-order design from 471 Command and Staff College student officers. Ten job requirement factors were validated against the criterion, using ratings of each factor on a 9-point scale for the 31 jobs, collected from 45 student officers. The resulting multiple regression equation predicted the criterion scale values almost perfectly (R^2 = .96), with only 5 factors receiving significant positive weights: Formal Education; Special Training and Experience; Originality, Ingenuity, and Creativeness; Decision Making; Planning. The role of management in developing a job evaluation plan is discussed. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

No Entries

25. PHYSICS

AD-417 112 Div. 25
(TISTP/WH) OTS price $2.50

IIT Research Inst., Chicago, Ill.
DISLOCATION MOBILITY AND PINNING IN HARD MATERIALS THROUGH INTERNAL FRICTION STUDIES.
Final rept., 1 Apr 62-31 Mar 63,
by P. D. Southgate and K. S. Mendelson. June 63, 95p.
Contract AF33 616 8132, Proj. 1 7350, Task 735003
ASD TDR62 431, Pt. 2 Unclassified report

Descriptors: (*Silicon, Crystals), (*Crystal lattice defects, Silicon), (*Internal friction, Deformation), Heat treatment, Silicon compounds, Carbides.

The internal friction due to dislocation motion in silicon crystals which have undergone controlled degrees of plastic deformation near 900 C is measured in the 3 kc to 80 kc frequency region. The observation reported previously, of a thermally activated rise between 600 C and 900 C, is confirmed, the activation energy usually being 1.6 eV, although some less reliable measurements gave values below 1.5 eV. The results in this region are consistent with a modification of Brailsford's built-in kink theory of damping. Attempts to produce a peak in internal friction by suitable treatment of specimens were unsuccessful, and so confirmation of the theory which the peak could have given is still required. At temperatures above 900 C the increase of internal friction with temperature becomes less, corresponding to an activation energy of about 1 eV. Annealing above 1000 C produces a considerable reduction in the internal friction, while maintaining the same activation energy for the process. The degree of anneal appears to depend on anneal temperature, the temperature of initial deformation, and oxygen content of the crystals. Further anneal at lower temperature can produce partial recovery of the internal friction. (Author)

AD-417 125 Div. 25, 16
(TISTP/WH) OTS price $2.60

Battelle Memorial Inst., Columbus, Ohio.
A STUDY OF NEAR INFRARED EMISSION FROM THE MAMMALIAN CEREBRAL CORTEX.
Rept. for Apr 62-Mar 63,
by Richard M. Roppel. June 63, 17p.
Contract AF33 657 8056, Proj. 7232, Task 723204
AMRL TDR63 66 Unclassified report

Report on Research on Logical Structure and Function of the Nervous System.

Descriptors: (*Cerebral cortex, Infrared radiation), (*Infrared radiation, Cerebral cortex), Cats, Rabbits, Bionics, Neurology, Physiology.

Experiments were conducted to investigate the existence and quantitative characteristics of photon radiation from the mammalian cerebral cortex, in excess of that due to thermal radiation. In some experiments, observations were carried out during electrical and chemical stimulation of the cortex. Measurements of emitted radiation were also made during termination of the animals by injection of cytotoxic materials into the brain via the carotid artery to achieve a rapid cessation of vital activity of the cortical tissue. During the termination experiments, small changes in radiancy of the cortical tissue were observed; the magnitudes of observed changes were not consistent. During the experiments in which electrical stimulation was applied, radiation changes were occasionally observed which were so related in time to the stimulus as to suggest causation by the stimulus. (Author)

AD-417 149 Div. 25, 15
(TISTP/HG) OTS price $2.60

University Coll., London (Gt. Brit.).
UNITARITY AND ANALYTICITY IN COMPLEX ENERGY PLANE OF GENERAL SCATTERING AMPLITUDES,
by N. S. Kronfli. 4 July 63, 18p. Technical note no. 14
Grant AF EOAR 63 3
AFOSR 5286 Unclassified report

Descriptors: (*Scattering, Mathematical analysis), (*Complex variables, Functions), Particles, Momentum, Operators (Mathematics), Integration, Integral equations, Equations, Vector analysis, Transformations (Mathematics), Real variables, Mass-energy relation, Bosons.

Analytic properties of general scattering amplitudes are considered under the assumption of analyticity in channel energy plane and using unitarity, similar behaviour is done for Feynman amplitudes. (Author)

AD-417 151 Div. 25, 8, 15
(TISTP/FEM) OTS price $5.60

Center for Operations Research, Mass. Inst. of Tech., Cambridge.
THE TRANSIENT SOLUTIONS FOR 3-STATE DISCRETE TIME MARKOV PROCESSES,
by Edward A. Silver. July 63, 55p. Technical note no. 1
Contract Nonr1841 87
Unclassified report

Descriptors: (*Statistical processes, Numerical analysis), (*Control systems, Numerical methods and procedures), Electric networks, Circuits, Oscillation, Damping, Partial differential equations, Integral transforms, Matrix algebra, Computers, Equations, Transformations (Mathematics).

AD-417 177 Div. 25, 15
(TISTP/HG) OTS price $2.60

New York U., Coll. of Engineering, N. Y.
ON THE EXACT SOLUTIONS OF THE NON-UNIFORM DISTRIBUTED LINES,
by Robert Maisel. Aug 63, 21p. Technical rept. no. 400 80; Scientific rept. no. 6
Contract AF19 628 379, Proj. 5628, Task 562801
AFCRL 63 340 Unclassified report

Descriptors: (*Electrical networks, Mathematical analysis), Electrical impedance, Differential equations, Functions, Electric current, Electric potential, Electric shunt, Capacitance, Taper.

Some of the exact solutions of the defining equations for non-uniform distributed networks are examined. The exact characterization of non-uniform distributed networks requires the solution of a second order linear differential equation with variable coefficients. For arbitrary coefficients, no solution in closed form is known. However, exact solutions may be found for certain simple classes of networks by requiring that these networks lead to equations which are

readily solvable by standard methods. The known exact solutions are briefly reviewed. A solution is deduced for a class of networks - the class having 'equidimensional' taper. The transient response of this line is also examined. (Author)

AD-417 179 Div. 25, 2
(TISTM/TCG) OTS price $17.00

Cruft Lab., Harvard U., Cambridge, Mass.
ON THE MAGNETIC PROPERTIES OF PIEZOELECTRIC GALLIUM-IRON OXIDE,
by Charles H. Nowlin. 30 Apr 63, 1v. Scientific rept. no. 7, Series 2
Contract AF19 604 5487, Proj. 5633, Task 56332
AFCRL 63 303 Unclassified report

Descriptors: (*Piezoelectric crystals, Magnetic properties), (*Gallium compounds, Piezoelectric crystals), (*Iron compounds, Piezoelectric crystals), Single crystals, Oxides, Ferromagnetic materials, Magnetic moments, Anisotropy, Instrumentation, Cryogenics, Sensitivity, Aluminum compounds, Acoustic properties, Magnetic fields, Garnet, Low frequency, Amplifiers, Phase shifters, Crystals, Crystal structure.

This study of the magnetic properties of oxide systems was undertaken primarily in order to understand better the magnetic structure and the probable source of the anisotropic behavior of piezoelectric, ferromagnetic gallium iron oxide. A vibrating-sample magnetometer with a sensitivity of 3 x 10 to the -5th power erg/gauss was constructed, in order to measure the magnetic moments of the various oxides. The basic magnetometer design of Foner was followed, but some important modifications were added. Changes were made in the cryogenic system in order to bring a previously erratic temperature behavior under control. The electronic system used incorporates two novel features. The first of these is the use of an A.C. servomotor and flywheel as an electromechanical phase-sensitive detector to indicate the nulls of the A.C. potentiometer. The response of this null detector is much faster than conventional electronic circuits having the same noise-discrimination. The second feature is a new, simplified twin-T frequency-selective amplifier. (Author)

AD-417 207 Div. 25
(TISTP/HG) OTS price $28.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
APPLIED THERMODYNAMICS AND HEAT TRANSFER,
by I. I. Novikov and K. D. Voskresenskiy.
21 June 63, 663p.
FTD TT63 17 Unclassified report

Trans. from Gosudarstvennoye Izdatel'stvo Literatury V Oblasti Atomnoy Nauk i Tekhniki, pp. 1-548, Moskva - 1961.

Descriptors: (*Thermodynamics, Energy conversion), (*Heat transfer, Transport properties), Equations of state, Specific heat, Irreversible processes, Gases, Enthalpy, Adiabatic gas flow, Entropy, Partial differential equations, Temperature, Convection, Differential equations, Fluids, Fluid flow, Integration, Theory, Tables, Liquids, Evaporation, Condensation, Vapors, Phase studies, Heat of reaction, Chemical equilibrium, Thermal radiation, Thermal conductivity, Heat transfer coefficients, Boundary layer, Heat exchangers, Absorption, Emissivity.

Bearing in mind the large relative significance of problems involved in the removal of heat from the nuclear reactors and its conversion into other types of energy, the basic information on thermodynamics and heat transfer are treated. (Author)

AD-417 235 Div. 25, 8
(TISTP/FEM) OTS price $1.60

Ventura Div., Northrop Corp., Newbury Park, Calif.
SCATTERING BY PERFECTLY CONDUCTING ARBITRARILY SHAPED CYLINDERS,
by Robert P. Banaugh. 26 Aug 63, 15p. Rept. no. TP68
Unclassified report

Descriptors: (*Electromagnetic waves, Cylindrical bodies), (*Cylindrical bodies, Scattering), Magnetic fields, Integral equations, Numerical methods and proceedures, Propagation, Partial differential equations, Special functions, Diffraction, Elastic scattering, Integrals.

The problem of the determination of the scattered field from a perfectly conducting cylinder of arbitrary cross-sectional shape is formulated in terms of an integral equation which is solved by a finite difference technique. Results are presented for a cross-section which is not a convex domain and the efficacy of the numerical method of solution is compared with results computed from eigenfunction expansions. (Author)

AD-417 250 Div. 25
(TISTP/FEM) OTS price $9.60

Ecole Normale Superieure (France).
INVESTIGATION OF DENSITY EFFECT IN SOLIDS AND GASES.
Final technical rept.
112p.
Contract DA91 591euc2011
Unclassified report

Descriptors: (*Cerenkov radiation, Charged particles), (*Ionization, Hydrogen), (*Secondary emission, Accelerometers), Gases, Solids, Helium, Metals, Density, Scattering, Bremsstrahlung, Carbon, Aluminum, Iron, Copper, Nickel, Silver, Tantalum, Gold, Electron beams, Measurement, Electrons, Ions, Sources, Energy, Elastic scattering.

This report describes the results obtained for the following experiments: (1) The pressure dependence of ionization by relativistic electrons. (2) Ionization by relativistic particles in helium-hydrogen gas mixtures. (3) Investigation of the operation of secondary emission monitors. (4) Direct electron-positron pair production by 150 MeV electrons. (5) Investigation of the density effect in C, Al, Fe, Cu, Ni, Ag, Ta, and Au. (Author)

AD-417 281 Div. 25, 9
(TISTP/WH) OTS price $2.60

General Applied Science Labs., Inc., Westbury, N. Y.
EXPERIMENTAL SOUND FIELD DISTRIBUTIONS OF A JET WITH A STATIONARY ACOUSTIC SOURCE,
by S. Slutsky. May 63, 19p. Technical rept. no. 351
Contract AF49 638 194
Unclassified report

Descriptors: (*Jets, Sound), (*Sound, Jets), (*Ultrasonic radiation, Experimental data), Underwater sound, Signal to noise ratio, Axially symmetric flow, Nozzles.

Measurements are made in the far field of an axisymmetric jet using a non-convecting ultrasonic source located on the jet axis. Reasonable comparisons are found with the results of an analytical model based on parallel flow and boundaries. Experiments were then carried out on a water table in which a two dimensional configuration was simulated under conditions of parallel steady jet flow, and of wavy jet flow. The results confirmed indications that the wavy flow in a jet is responsible for the diffusion of sound field directionality. (Author)

AD-417 283 Div. 25
(TISTE/OHD) OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
THE INVESTIGATION OF AN ELECTRON RESONANCE SPECTROMETER UTILIZING A GENERALIZED FEEDBACK MICROWAVE OSCILLATOR,
by John B. Payne, III. Aug 63, 22p.
RADC TDR63 297 Unclassified report

Descriptors: (*Paramagnetic resonance, Electrons), (*Spectroscopy, Microwave oscillators), (*Microwave oscillators, Feedback), Microwave amplifiers, Sensitivity, Air force research, Noise (Radio), Mathematical analysis, Electronic equipment.

The study of Electron Paramagnetic Resonance (EPR) has yielded much information on molecular interaction and binding forces present in solid state as well as gaseous materials. In this investigation, an entirely different approach is taken to develop a self-stabilized EPR spectrometer system which eliminates the usual low power klystron oscillator, electronic frequency stabilizing equipment, and the complex superheterodyne detector, without sacrificing loss of detection sensitivity. This system, which is known as an oscillator-spectrometer, consists of a microwave amplifier containing a sample-carrying network element in the positive feedback loop. The microwave device oscillates at the network's central resonant frequency with essentially instantaneous frequency stability. Expressions relating the change in power level and frequency of oscillation as a function of the change in the network attenuation and phase at magnetic resonance are derived. The system's ultimate sensitivity is determined by analyzing the noise within the oscillator loop. The problem reduces to the fact that if an amplifier with noise figure F1 is connected as an oscillator, what, then, will be the resultant noise fluctuation of the oscillators's frequency and output amplitude. (Author)

AD-417 338 Div. 25, 8
(TISTP/WH) OTS price $1.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
FUNDAMENTAL STUDIES IN THE MICROWAVE PROBING OF MEDIUM AND HIGH-DENSITY PLASMAS.
Final rept.,
by M. Ettenberg. 26 July 62, 11p. Rept. no. PIBMRI1056 62
Contract AF19 604 8070, Proj. 6692, Task 669202
AFCRL 62 895 Unclassified report

Descriptors: (*Plasma physics, Electron density), (*Electron density, Measurement), (*Microwaves, Reflection), Dielectric properties, Partial differential equations, Electric discharges, Hydrogen.

Two methods have been developed to measure the electron density profile of a plasma which varies in one dimension. The methods are based on measurements of the phase of a microwave signal reflected from the plasma. It is necessary that the plasma frequency somewhere be greater than the microwave probing frequency. It is also necessary that the electron density variation be slow enough so that the WKB approximation to the solution of the wave equation is valid. These conditions are usually met in laboratory plasmas. An experiment on a pulsed hydrogen discharge has been used to apply one of the diagnostic methods. (Author)

AD-417 342 Div. 25, 8
(TISTM/AMS) OTS price $7.60

CBS Labs., Stamford, Conn.
INFRARED EMITTING PHOSPHORS.
Final rept.,
by Emil H. Thielens. Feb 63, 36p.
Contract AF19 604 8068, Proj. 7674, Task 76759
AFCRL 63 657 Unclassified report

Descriptors: (*Phosphorescent material, *Infrared phenomena), Electron beams, Electron bombardment, Phosphorescence, X-ray diffraction analysis, Cathode ray tubes, Lead compounds, Sulfides, Zinc compounds, Cobalt, Cadmium compounds, Photography, Mercury compounds, Copper, Radiation damage, Silver, Vanadium, Cadmium alloys, Tellurium alloys, Experimental data, Theory, Laboratory equipment, Test equipment.

The purpose of this investigation has been to find and develop phosphors, particularly for the infrared region which can be excited by cathode rays. The emphasis has therefore been predominantly on infrared rather than visible emission phosphors. In particular (1) an early assessment has been possible for optimum phosphors in the photographic sensitivity region excited by electrons; (2) infrared phosphors have been made and studied under photon and electron excitation over the range 1-3.5 microns. Estimates of absolute power conversion efficiencies have been obtained, e.g. 8% for cadmium sulfide emitting at ~1 micron and excited by 20 kV electrons; (3) an appraisal of available and optimum phosphors for two specific regions 1.6 and 2.7 microns has been made. The experimental study of infrared phosphors involves specialized techniques which have been developed in the laboratories with special reference to the provision of a versatile demountable cathode ray tube system in which the phosphors can be excited over a wide range of temperatures. (Author)

AD-417 362 Div. 25, 26, 8
(TISTP/FEM) OTS price $1.60

Piezo Crystal Co., Carlisle, Pa.
PRODUCTION ENGINEERING MEASURE FUNDAMENTAL MODE CRYSTAL FOR FILTERS CR(XM-41)/U.
Quarterly rept. no. 7, 10 Dec 62-9 Mar 63. 11p.
Contract DA36 039sc85956
Unclassified report

Descriptors: (*Crystals, Manufacturing methods), (*Quartz, Crystals), Crystal filters, Quartz resonators, High frequency, Oscillators, Etched crystals, Production, Thickness, Plating, Temperature.

During this quarter we report data on yields and quality of filter crystals. Our preproduction samples were submitted October 30, 1962. We had reported some of the work done on Pre-pilot groups of crystals to prove or improve our processes in a previous report. (Author)

Division 25 - PHYSICS

AD-417 364 Div. 25, 30, 17
(TISTM/EJH) OTS price $1.10

Army Engineer Research and Development Labs., Fort Belvoir, Va.
ELECTRON MICROSCOPE STUDIES OF ANTIMONY CESIUM-LAYERS,
by A. I. Frimer. 16 Sep 48, 7p. Trans. no. T1690
Unclassified report

Trans. from DAN SSSR 63:3, pp. 255-257, 1948.

Descriptors: (*Antimony, Films), (*Cesium, Films), (*Films, Electron microscopy), (*Electron microscopy, Films), Vapor plating, Cathodes, Cesium alloys, Antimony alloys, Heat treatment, Electron beams.

AD-417 366 Div. 25
(TISTM/BRW) OTS price $1.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
PHOTOSENSITIVITY AND SECONDARY ELECTRON EMISSION FROM OXYGEN CESIUM LAYERS IN DIFFUSION PROCESSES,
by A. Dobrolyubsky. 1963, 14p.
AERDL T 1688 Unclassified report

Trans. from Zhurnal tekhnicheskoy fiziki, 8:3, pp. 226-231, 1938.

Descriptors: (*Semiconducting films, Photosensitivity), (*Photosensitivity, Metal films), (*Metal films, Cesium), (*Secondary emission, Semiconducting films), Diffusion, Oxygen, Silver, Silver compounds, Cesium compounds, Oxides, Plating, Reduction (Chemistry), Films, Oxidation.

Statistically correlated data are reported on changes in photosensitivity and secondary electron emission associated with an increased number of metallic silver particles in the layer Cs - Cs20, Cs, Ag - Ag20, Ag (results obtained for 16 different devices). A Japanese method was used to introduce an excess of metallic particles into the layer. The results obtained are discussed with respect to the origin of photo- and secondary electron emission observed in such layers. (Author)

AD-417 373 Div. 25
(TISTP/MH) OTS price $13.50

Iowa State U., Iowa City.
STATISTICAL THEORY OF ENERGY-LEVEL SPACING DISTRIBUTIONS FOR COMPLEX SPECTRA,
by Harvey S. Leff. June 63, 194p. Rept. no. SUI63 23
Grant AFOSR62 122
AFOSR Rept. no. 5269 Unclassified report

Descriptors: (*Nuclear energy levels, Statistical analysis), (*Nuclear spectroscopy, Statistical analysis), Energy, Theory, Nuclei Excitation, Spin, Parity, Nuclear spectroscopy, Matrix algebra, Density, Polynomials, Operators (Mathematics).

Heavy and intermediate weight nuclei have energy-level spectra which are quite complex. It is therefore natural to use statistical methods in describing their energy-level structure. The statistical properties of interest here are the level spacing distributions. The present work includes four main objectives: (1) to give precise mathematical definitions for the mth order spacing distributions without specifying a particular ensemble, (2) to obtain a connection between ensembles of Hermitian matrices and ensembles of unitary matrices, (3) to introduce an entire class of 'generalized' ensembles for which various statistical properties can be calculated formally, and (4) to use the formalism of (1) to find the mth order distributions for series of levels with mixed spins and parities. (Author)

AD-417 377 Div. 25
(TISTP/HG) OTS price $1.10

Oregon U., Eugene.
DYNAMICS OF BLOCH ELECTRONS IN SOLIDS,
by Gregory H. Wannier. 1 Oct 62, 4p.
Contract Nonr277105, Proj. NR017 633
Unclassified report

Descriptors: (*Solid state physics, Research program administration), Abstracts, Dynamics, Electrons, Magnetic fields, Electric fields, Perturbation theory, Field theory, Electron transitions.

AD-417 399 Div. 25
(TISTP/FEM) OTS price $1.10

Georgetown U., Washington, D. C.
A THEORETICAL STUDY OF THE VIBRATIONS AND ROTATIONS OF DIATOMIC MOLECULES.
Final technical rept., June-Aug 63,
by Charles L. Beckel. Aug 63, 7p.
Grant AF AFOSR62 160
AFOSR Rept. no. 5280 Unclassified report

Descriptors: (*Diatomic molecules, Rotation), (*Molecular rotation, Hydrogen), Models (Simulations), Molecular structure, Ionization, Polarization, Ions, Physical properties, Vibration, Chemical properties, Harmonic oscillators, Energy, Valence.

AD-417 414 Div. 25, 9
(TISTP/FEM) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HIGH-VELOCITY CUMULATIVE JETS,
by N. P. Novikov. 15 Aug 63, 15p.
FTD TT63 566 Unclassified report

Trans. from Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, No. 6, pp. 22-28, 1962.

Descriptors: (*Plasma jets, Velocity), (*Detonations, Plasma jets), (*Hydrodynamics, Theory), Photographs, Vacuum apparatus, Vapor pressure, Vaporization, Aluminum, Iron, Photographic analysis, Experimental data, Measurement, Argon, Spectrum analyzers, Cylindrical bodies, Metals, Atomic energy levels, X-ray photography, Entropy, Isotropism.

The obtaining of high-velocity cumulative jets is described, the structure of the jets is studied from slow-motion pictures and the state of the material in them is studied from the luminosity spectra of the process, a number of dependences of the velocity of the high-velocity jet on various parameters are given, and, finally, an attempt is made to consider the high-velocity and main cumulative jets as the discharge of a highly compressed metal into a vacuum. (Author)

AD-417 440 Div. 25
(TISTP/HG) OTS price $1.10

Aerospace Corp., Los Angeles, Calif.
PROFESSIONAL PAPERS CLEARED FOR POSSIBLE PUBLICA-

TION AND/OR PRESENTATION.
Rept. for 16 July-15 Aug 63,
by Frances A. Brady. 31 Aug 63, 5p. Rept. no.
CSR269 9990PP2
Contract AF04 695 269
Unclassified report

Descriptors: (*Bibliography, Physics), (*Physics, Bibliography), Plasma physics, Electromagnetism.

AD-417 468 Div. 25, 9, 8
(TISTP/FEM) OTS price $5.60

University of Southern Calif., Engineering Center, Los Angeles.
STUDY OF PLASMAS IN HYPERSONIC FLOW,
by David Robinson and James C. Williams, III.
July 63, 55p. Technical rept. no. EE26;
USCEC R81 101
Contract DA04 495ORD3047, Proj. DA59901007, and Proj. TB2 002
AROD 2790 1 Unclassified report

Descriptors: (*Hypersonic flow, Plasma physics), (*Hypersonic nozzles, Plasma medium), Boundary layer, Axially symmetric flow, Density, Aerodynamic characteristics, Rotation, Excitation, Nitrogen, Recombination reaction, Molecular spectroscopy, Band spectrum, Line spectrum, Equations, Radiofrequency generators.

A Mach 6 low-density nozzle has been designed and constructed for studies of the decay of a nitrogen plasma after excitation by a radio-frequency discharge. Aerodynamic measurements have been made of the Mach number and density distribution for both cold and hot flow conditions. A method of measuring the heavy particle temperature in a plasma is described using the rotational structure of the N sub 2 second positive band system. (Author)

AD-417 474 Div. 25, 4
(TISTM/TCG) OTS price $1.10

Oregon State U., Corvallis.
RADIATION-COLORING OF ALKALI HALIDE CRYSTALS CONTAINING SULFATE IONS,
by Allen B. Scott and B. J. Bosco. 1 Aug 63, 7p.
Contract Nonr128605, Proj. NR018 701
ONR Technical rept. no. 5
Unclassified report

Descriptors: (*Alkali metals, Halides), (*Color centers, Alkali metals), (*X rays, Color centers), Calcium compounds, Strontium compounds, Sulfates, Ions, Potassium compounds, Barium compounds, Chlorides, Single crystals.

This report is concerned with a third effect which also may be anticipated in view of the interactions between divalent anions and divalent cations in an alkali halide matrix. Alkali halide crystals containing Ca or Sr additions may be colored much more rapidly and to a higher initial color-center concentration, by X-irradiation than relatively pure crystals. Whether the effect is due to the presence of positive-ion vacancies or to the specific properties of the divalent cations themselves is not yet ascertained, but it was supposed that sulfate ions, acting both to repress the positive-ion vacancy concentration and to form ion-pairs (or even a precipitated second phase of CaSO4 or SrSO4) should counteract the accelerating effect of the divalent cations. (Author)

AD-417 479 Div. 25, 9
(TISTP/FEM) OTS price $2.60

Cornell U., Ithaca, N. Y.
THE HYDROMAGNETICS OF AN ELLIPSOID MOVING IN A CROSS-FIELD,
by G. S. S. Ludford and M. P. Singh. July 63, 21p. TR no. 4
Contract Nonr40146 and Grant G19911
Unclassified report

Descriptors: (*Magnetohydrodynamics, Magnetic fields), (*Ellipsoids, Electrical conductance), Fluids, Solids, Fluid flow, Spheres, Incompressible flow, Equations, Transformations (Mathematics), Partial differential equations.

AD-417 490 Div. 25
(TISTP/WH) OTS price $1.10

Stanford U., Calif.
(No title).
Final research rept.,
by G. E. Pake. 1962, 3p.
Contracts AF49 638 1056 and AF18 603 131
AFOSR 5278 Unclassified report

Descriptors: (*Crystals, Research program administration), (*Magnetic properties, Crystals), Organic materials, Free radicals.

AD-417 511 Div. 25
(TISTP/MH) OTS price $8.60

Floyd Newman Lab. of Nuclear Studies, Cornell U., Ithaca, N. Y.
EXCITED STATES OF THE NUCLEON,
by P. Carruthers. July 63, 1v.
Contract Nonr40138
Unclassified report

Descriptors: (*Nucleons, Excitation), Neutron scattering, Proton scattering, Meson scattering, Pions, Quantum mechanics, Resonance scattering, Resonance, Dynamics, Elementary particles, Inelastic scattering, Differential cross sections, Momentum, Parity, Bosons, Particle trajectories.

The quantum numbers of the higher resonances in pion-nucleon scattering belonging to the nucleon and 3-3 isobar trajectories are shown to arise from the exchange of the nucleon and pion-nucleon resonances themselves. In particular the members of the nucleon trajectory are created principally by forces due to the exchange of members of the 3-3 isobar trajectory and vice-versa. The quantum numbers obtained from dynamical considerations agree completely with these conjectured on the basis of Regge pole considerations. The dynamical scheme is approximately symmetrical under interchange of the two trajectories. (Author)

AD-417 514 Div. 25, 14
(TISTM/BRW) OTS price $3.60

Stanford U., Div. of Engineering Mechanics, Calif.
ON THE GENERATION OF RESIDUAL STRESSES IN THERMO-VISCOELASTIC BODIES,
by E. H. Lee and T. G. Rogers. July 63, 1v.
Technical rept. no. 139; Rept. no. 1
Contract NOw63 0175
Unclassified report

Descriptors: (*Materials, Viscoelasticity), (*Stresses, Mathematical analysis), Thermal stresses, Relaxation time, Cooling, Thermal expansion, Deformation, Solids, Spheres, Acrylic resins, Glass, Temperature, Polymers, Surfaces.

The development of residual stress distributions in thermo-viscoelastic materials due to surface cooling is considered. They arise because the non-uniform thermal contraction generates irreversible viscoelastic deformation, which tends to become permanent as the temperature falls due to the rapid growth of relaxation times with temperature reduction. Examples of a cooled solid sphere of polymethylmethacrylate are evaluated and the results are compared with previous analyses based on an elastic-inviscid fluid model. For application in design to generate beneficial residual stress distributions, the need to assess the entire stress history is pointed out, and relevant features of the phenomenon are discussed. (Author)

AD-417 517 Div. 25
(TISTM/EJH) OTS price $10.50

Stockholm U. (Sweden).
THEORETICAL INVESTIGATIONS OF THE ELECTRONIC STRUCTURES AND STATES OF MOLECULES AND CRYSTALS.
Final technical rept., 1 Mar 62-28 Feb 63,
by Inga Fischer-Hjalmars and Stig Flodmark.
28 Feb 63, 1v.
Contract DA91 591EUC2270
Unclassified report

Descriptors: (*Quantum mechanics, Crystals), (*Single crystals, Quantum mechanics), (*Molecules, Quantum mechanics), Electrons, Crystal lattices, Crystal structure, Zirconium compounds, Oxides, Atomic orbitals, Zirconium, Oxygen, Oxygen compounds, Hydrides, Atomic energy levels, Chemical bonds, Symmetry (Crystallography), Phase studies, Programming (Computers), Integral equations, Mathematical analysis, Theory.

AD-417 520 Div. 25, 4
(TISTM/REB) OTS price $15.00

Naples U. (Italy).
(No title).
Final technical rept. 1 Feb 62-31 Jan 63.
31 Jan 63, 119p.
Contract DA91 591EUC2154
Unclassified report

Descriptors: (*Organic compounds, Molecular spectroscopy), (*Molecular spectroscopy, Organic compounds), Molecular properties, Vibration, Molecular rotation, Aromatic compounds, Organic nitrogen compounds, N-Heterocyclic compounds, Boron compounds, Infrared spectroscopy, Deuterated compounds, Synthesis (Chemistry), Programming (Computers), Programming languages.

The results of a research project on vibrational assignments and force constants calculations on cyclic molecules carried on at the University of Naples are described. The first part deals with the description of the computer program for force constants calculation. This program has been written in Snap code for a Bendix G-20 computer with 8000 magnetic core memories, and is made up of three separate routines. The second part of the report describes the results obtained in the interpretation of the spectra of the cyclic molecules studied as well as of their deuterated analogues and the syntheses devised for their preparation. (Author)

AD-417 536 Div. 25
(TISTP/MH) OTS price $8.10

Barkley and Dexter Labs., Inc., Boston, Mass.
RESEARCH INTO GRAVITY MEASURING TECHNIQUES.
Final rept.
Mar 63, 56p.
Contract AF19 604 7220, Proj. 7600, Task 760007
AFCRL 63 665 Unclassified report

Descriptors: (*Gravity, Measurement), Data, Test equipment, Calibration, Analysis, Mechanics, Pumps, Sapphires, Oscillations, Molybdenum, Harmonic oscillators.

The use and description of two AFCRL relative gravity bi-pendulum apparatus are discussed. Operating instructions and details of data acquisition and reduction are also presented. Modifications and improvements to the equipment are described, and an evaluation is given. Several gravimeters, used as support equipment or as subjects for evaluation, are also described. (Author)

AD-417 546 Div. 25
(TISTP/MH) OTS price $2.50

General Electric Co., Syracuse, N. Y.
EXPLORATORY STATIC ENERGY CONVERSION-MULTILAYER THERMIONICS.
Final rept., 1 July 62-1 May 63,
by P. R. Emtage and W. J. van der Grinten.
Aug 63, 101p.
Contract AF33 657 9204, Proj. 8173, Task 817305
19
ASD TDR63 723 Unclassified report

Descriptors: (*Thermionic converters, Thin films), Solid state physics, Semiconducting films, Metals, Heat transfer, Electric potential, Measurement, Germanium, Thermoelectricity, Anisotropy, Temperature, Energy conversion.

A new static heat-to-electricity conversion principle has been studied and is described. The new principle involves an attempt to duplicate the performance of a vacuum tube thermionic converter, in the solid state and at a lower temperature. The basic arrangement is a multiple thin film structure, consisting of alternate layers of semiconductors and metals, arranged perpendicular to the direction of heat flow. Transverse and longitudinal Seebeck voltage measurements have been made on mono- and multilayers of germanium films. Thermoelectric anisotropies and very pronounced. Temperature dependencies in the vicinity of room temperature were found to be relatively small. Theoretical considerations suggest that the basic mean free path limitations that apply to charge carriers in a given semiconductor or insulator control the conversion efficiency of solid state thermionics to the extent as they do in conventional thermoelectrics. No basic superiority can be attributed to either process. The experimental program is not sufficiently well developed yet to verify any of the theoretical criteria. (Author)

AD-417 547 Div. 25
(TISTP/FR) OTS price $1.10

Cornell U., Ithaca, N. Y.
THE HYDROMAGNETICS OF A SPHERICAL CONDUCTOR.
Technical rept. no. 5,
by G. S. S. Ludford and M. P. Singh. July 63,
5p.
Contract Nonr40146 and Grant G19911
Unclassified report

Descriptors: (*Spheres, Magnetic fields), Magnetic fields, Electrical conductance, Electric currents.

AD-417 561 Div. 25
(TISTE/CAM) OTS price $3.60

Eaton Electronics Research Lab., McGill U. (Canada).
(No title).
Annual rept.
Aug 63, 37p.
Contract Nonr301300, Task 018 503
Unclassified report

Descriptors: (*Solenoids, Design), Theory, Magnetic fields, Electric current, Power, Configuration, Aluminum, Liquid cooled, Liquefied gases, Heat transfer, Heat exchangers, Pressure.

A two region solenoid consists of an inner solenoid placed within the bore of a large outer solenoid. It is shown that a two region solenoid can always be built which has a higher magnetic efficiency (lower power consumption) than a single solenoid producing the same field over the same volume. The two region solenoid also gives an important reduction in the stress level. These advantages are expected to be decisive in the design of large high-field cryogenic magnets. (Author)

AD-417 562 Div. 25
(TISTP/MFA) OTS price $3.60

Ecole Normale Superieure (France).
DYNAMICS OF NON-LINEAR PLASMA OSCILLATIONS,
by G. Kalman and G. Toulouse. 15 June 63, 31p.
Technical note no. 3
Contract AF61 052 613
ARL 63 182 Unclassified report

Descriptors: (*Plasma oscillations, Perturbation theory). (*Nonlinear systems, Analysis). Fourier analysis, Particles, Motion, Mathematical models, Harmonic oscillators, Frequency shift, Dynamics.

A consistent perturbation method for the calculation of non-linear effects in plasma oscillations in a one component system without magnetic field, is studied. The unperturbed state is that of a ''cold'' plasma, without thermal particle motion; particle-plasmon interaction appears through non-linearity only. A diagram technique is worked out which facilitates the application of some field theoretic methods. The frequency-shift due to non-linearities self-energy effect is calculated in detail. (Author)

AD-417 563 Div. 25
(TISTP/MH) OTS price $1.10

Israel Inst. of Tech. (Haifa).
INTERACTION OF QUANTIZED AND UNQUANTIZED SYSTEMS,
by Asher Peres. 14 June 63, 7p. Technical note no. 3
Grant AF EOAR63 107
ARL 63 184 Unclassified report

Descriptors: (*Quantum mechanics, Measurement), (*Gravity, Quantum mechanics), Electrons, Operators (Mathematics), Linear systems, Equations, Theory, Electromagnetic field, Nonlinear systems, Measure theory, Energy, Momentum, Tensor analysis, Dynamics.

It is shown that interactions between quantized and unquantized systems do not lead to any dynamical inconsistencies. However, if the equations of motion of the classical system depend on the state of the quantized system, then the latter no longer satisfies a linear dynamical equation. This fact may have implications in the quantization of the gravitational field and in the quantum theory of measurement. (Author)

AD-417 564 Div. 25
(TISTM/ODN) OTS price $1.60

Israel Inst. of Tech. (Haifa).
CLASSICAL THEORY OF THE DIRAC ELECTRON,
by Zvi Grossmann and Asher Peres. 2 June 63, 14p.
Technical note no. 2
Grant AF EOAR63 107
ARL 63 177 Unclassified report

Descriptors: (*Electrons, Theory), (*Quantum mechanics, Electrons), Operators (Mathematics), Equations, Motion, Spin.

This paper contains the Hamiltonian theory of a classical particle displaying all the features of the Dirac electron (spin, Zitterbewegung, etc) except, of course, for the superposition principle. The particle is described by ten internal canonical variables, of which three are the spin angular momentum vector. The seven other variables have no simple physical meaning, but are nevertheless necessary for a consistent theory. The equations of motion are not manifestly covariant, and the Lorentz invariance of the theory is proved by constructing the ten generators of the inhomogeneous Lorentz group. (Author)

AD-417 626 Div. 25
(TISTP/MH) OTS price $1.00

IIT Research Inst., Chicago Ill.
FUNDAMENTALS OF NONLINEAR ACOUSTICS.
Rept. for Dec 60-Mar 63,
by William C. Sperry. June 63, 24p.
Contract AF33 616 7746, Proj. 7231, Task 723105
AMRL TDR63 62
Unclassified report

Descriptors: (*Acoustics, Non-linear systems), Propagation, Sound, Equations, Fluids, Sound transmission, Tensor analysis, Momentum, Stresses, Motion, Energy, Equations of state, Differential equations.

Background, philosophy, and problem areas for the special field of nonlinear acoustics are discussed. Basic equations for the propagation of sound in homogeneous continuous fluid media are presented in an ordered form where inherent limitations are noted. Without an ordered arrangement of the fundamental equations for which the limitations are clearly delineated, two pitfalls are apt to be encountered. First, an erroneous assumption may be made that any particular set of equations is exact. There are no available exact equations, only equations that may be sufficiently accurate for the particular problem of interest. The second pitfall is that a more complicated set of equations may be chosen than is merited for the problem under consideration. (Author)

AD-417 627 Div. 25
(TISTP/FR) OTS price $3.60

ITT Federal Labs., Nutley, N. J.
HALL AND RESISTIVITY MEASUREMENTS ON SEMICONDUCTING DIAMONDS,
by R. L. Schelhorn and H. G. Nordin. July 63, 30p. Scientific rept. no. 1
Contract AF19 628 225, Proj. 5621, Task 562104
AFCRL 63 309 Unclassified report

Descriptors: (*Diamonds, Semiconductors), Semiconductors, Hall effect, Electric potential, Temperature, Resistance (Electrical), Measurement, Instrumentation.

Research was performed to determine the inherent phenomena causing semiconductivity in diamonds, with special consideration for the rare natural type II-b material. In the reported phase of this work, resistivity and Hall coefficient have been carefully measured on several type II-b samples over the temperature range of 100 K to 900 K. The apparatus developed for these measurements is described. From these measurements, the activation energy of the principal acceptor level was determined for each specimen, and concentrations of donors and acceptors were deduced by a graphical method. (Author)

AD-417 629 Div. 25
(TISTM/BRW) OTS price $3.60

Forest Products Lab., Madison, Wis.
DETERMINATION OF MECHANICAL PROPERTIES OF ADHESIVES FOR USE IN THE DESIGN OF BONDED JOINTS,
by Edward W. Kuenzi and Gordon H. Stevens.
Sep 63, 32p. Rept. no. FPL-011
Unclassified report

Report on U. S. Forest Service Research Note.

Descriptors: (*Adhesives, Mechanical properties), (*Bonded joints, Adhesives), Design, Test methods, Elasticity, Shear stresses, Tensile properties, Metal joints, Stresses, Strain (Mechanics), Phenolic plastics, Vinyl plastics, Acrylonitrile polymers, Adhesive tapes, Epoxy plastics, Polyamide plastics, Compressive properties, Aluminum alloys, Sheets, Pipes.

This report describes methods for determining the basic mechanical properties of adhesives subjected to shear or tension in bonds between relatively rigid adherends. The use of the adhesive properties for designing lap joints is also discussed. (Author)

AD-417 639 Div. 25
(TISTP/FR) OTS price $4.60

Technische Hochschule, Aachen (Germany).
RESEARCH ON PHOTOELASTIC STRESS ANALYSIS FOR TURBINE DISCS WITH NOTCH INFLUENCES.
Technical note, 1 Jan 58-31 Dec 58,
by K. Leist. 31 Jan 59, 32p.
Contract AF61 514 1147
Unclassified report

Descriptors: (*Disks, Stresses), Turbine wheels, Turbine blades, Stresses, Photoelasticity.

AD-417 642 Div. 25, 4
(TISTM/EJH) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
THERMODYNAMIC PROPERTIES OF METHANE AT HIGH DENSITIES,
by Walter M. Madigosky. 22 Apr 63, 12p.
NOL TR63 101 Unclassified report

Descriptors: (*Organic compounds, Hydrocarbons), (*Gases, Hydrocarbons), (*Specific heat, Hydrocarbons), Thermodynamics, Sound transmission, Density, Pressure, Temperature, Volume, Mathematical analysis, Programming (Computers).

The specific heats at constant volume and pressure and the sound velocity have been calculated from an empirical equation of state based on a series evaluation of the P.V.T. data of Kvalnes and Gaddy. The low density results agree well with those previously calculated. These values are now extended up to 600 Amagats. (Author)

AD-417 645 Div. 25
(TISTP/MH) OTS price $2.60

AVCO Everett Research Lab., Everett, Mass.
CRITICAL CURRENT AND FIELD IN NON-IDEAL SUPERCONDUCTORS,
by A. El Bindari and M. M. Litvak. July 63, 20p.
Research rept. no. 162
Contract AF04 694 33
BSD TDR63 148 Unclassified report

Descriptors: (*Superconductors, Electric currents), Magnetic fields, Vanadium alloys, Titanium alloys, Low temperature research, Superconductivity, Alloys, Zirconium alloys, Niobium alloys, Models.

The upper critical fields of the V-Ti system were measured at 4.2 degrees K and agree with Gorkov-Shapoval's expression for the upper critical field of superconducting alloys. The critical current of samples of V with varying Ti content and also of Nb-25% Zr, all of rectangular cross-section (.008 in. x .025 in.), was measured as a function of the magnetic field H sub a applied parallel to the width of the strip. When the critical current I is plotted in units of the Silsbee current I sub c (based on the thermodynamic critical field H sub c, versus the applied magnetic field measured in units of the Gorkov-Shapoval upper critical field (H sub 2), the experimental data for all the samples tested fall on a single curve. This critical curve is deduced from the free energy of a laminar mixed state model such that the applied current flows mainly within a penetration depth along the width of the strip (end effects are neglected). (Author)

AD-417 682 Div. 25
(TISTM/REB) OTS price $8.60

Battelle Memorial Inst., Geneva (Switzerland).
DETAILS OF MATHEMATICAL METHODS EMPLOYED FOR THE EVALUATION OF THE SECOND-ORDER THREEBODY INTERACTIONS.
Special technical and scientific rept. no. 6,
1 Aug 62-31 July 63,
by Samson Zimering and Laurens Jansen.
31 July 63, 89p.
Contract DA91 591EUC2846
Unclassified report

Report on Solid State Properties of Non-Conducting Materials of Simple Monatomic and Diatomic Species.

Descriptors: (*Helium group gases, Atoms), (*Atoms, Chemical reactions), (*Crystals, Helium group gases), Solidified gases, Diatomic molecules, Stability, Quantum mechanics, Mathematical analysis, Theory, Integral equations, Functions, Neon, Argon, Krypton, Xenon.

A detailed description is given of mathematical methods used for the evaluation of second-order threebody interactions between atoms of the heavy rare gases of neon, argon, krypton and xenon. Argon is used as a standard example for which the different expressions will be evaluated numerically. Since the analytical forms for these expressions are the same for the other heavy rare gases, similar general results are obtained in all cases. (Author)

AD-417 686 Div. 25
(TISTM/BRW) OTS price $6.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOLID STATE RESEARCH, 1963, NO. 2.
16 Aug 63, 50p.
Contract AF19 628 500
Unclassified report

Descriptors: (*Solid state physics, Scientific research), (*Solids, Solid state physics), Diodes (Semiconductor), Masers, Lasers, Crystal growth, Superconductivity, High pressure research, Electromagnetic fields, Spectroscopy, Magnetic materials, Paramagnetic materials, Ultrasonic properties, Transition elements, Rare earth compounds, Optical phenomena, Infrared phenomena, Anisotropy.

Contents: Solid State Device Design; Materials Research; Band Structure and Spectroscopy of Solids; Spectroscopy of Magnetic Solids; Transition-Metal and Rare-Earth Compounds; and Optics and Infrared.

AD-417 719 Div. 25
(TISTP/MH) OTS price $2.60

Microwave Lab., Stanford U., Calif.
INTERACTION OF ACOUSTIC WAVES AND ELECTRIC CURRENTS IN SOLIDS,
by A. Tonning. Aug 63, 22p. M L Rept. no. 1068
Contract Nonr22548, Proj. NR373 361
Unclassified report

Descriptors: (*Space charges, Modulation), Transport properties, Solids, Electrons, Acoustics, Deformation, Piezoelectric effect, High frequency, Linear systems, Equations, Electric currents, Solid state physics.

On the basis of Boltzmann's transport equation an expression is derived for the space-charge modulation in a current-carrying solid when a periodically varying force is acting on the electrons. The force may be caused by an acoustic wave interacting with the electrons through the deformation potential or through the piezoelectric effect. These two special cases are discussed and the condition for obtaining amplification of the acoustic wave is derived. The high-frequency properties of the two interaction machanisms are studied. In an appendix it is shown that the deformation potential mechanism may be described by two linear equations similar to the well-known piezoelectric equations. (Author)

AD-417 722 Div. 25
(TISTP/FR) OTS price $5.60

Naval Weapons Lab., Dahlgren, Va.
HEAT TRANSFER FROM A FLAT SURFACE BY ROTATING FLOWS,
by Hans J. Lugt and Ernst W. Schwiderski.
July 63, 1v.
NWL Rept. no. 1875 Unclassified report

Descriptors: (*Heat transfer, Fluid flow), Surface properties, Fluid flow, Vortices, Rotation, Boundary layer, Temperature.

The heat transfer by rotating laminar flows from a flat surface was investigated. Dissipation is considered, whereas free convection effects are neglected. The calculation is based on the knowledge of the flow fields, which have been studied in previous papers by the authors. In these papers, axisymmetric boundary layers were re-examined according to an extended boundary layer theory. The basic ideas of this theory are applied to thermal boundary layers. The energy equation is reduced to an ordinary differential equation. In the special case of negligible dissipation the heat transfer of Karman-type flows can be compared with existing experimental data. The agreement is good. (Author)

AD-417 747 Div. 25
(TISTM/AM) OTS price $1.50

Harshaw Chemical Co., Cleveland, Ohio.
RESEARCH ON PHOTOCONDUCTIVITY IN THIN FILMS.
Final rept., June 62-July 63,
by E. L. Lind, F. N. Lancia and E. R. Hill.
29 July 63, 51p.
Contract AF33 657 9194, Proj. 4156, Task 415605
ASD TDR63 654 Unclassified report

Descriptors: (*Photoconductivity, Films), (*Photosensitivity, Materials), Preparations, Photons, Grain boundaries, Equations, Sulfides, Antimony compounds, Cadmium compounds, Selenium compounds, Temperature, Single crystals, Electric potential, Measurement, High temperature research, Evaporation, Test equipment, Vacuum apparatus, Tables, Data, Resistance (Electrical).

AD-417 750 Div. 25
(TISTP/FR) OTS price $1.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
COMMENTS ON DERIVATION OF THE MAGNETOHYDRODYNAMICS EQUATIONS.
Technical rept.,
by J. A. Laurmann. 28 Feb 63, 9p. Rept. no. 6 90 63 34
Unclassified report

Report on physics.

Descriptors: (*Magnetohydrodynamics, Equations).

AD-417 758 Div. 25
(TISTP/MH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EXPERIMENTAL INVESTIGATION OF THE EFFECT OF A TRANSVERSE MAGNETIC FIELD ON VELOCITY DISTRIBUTION IN A MERCURY FLOW,
by G. G. Branover, I. M. Kirko and O. A. Liyelausis. 25 Apr 63, 8p.
FTD TT62 1827 1 2 Unclassified report

Trans. from Prikladnaya Magnitogidrodinamika, Trudy Instituta Fiziki, AN Latviyskoy SSR, No. 12, pp. 167-175, 1961.

Descriptors: (*Magnetohydrodynamics, Mercury), (*Mercury, Magnetohydrodynamic), Magnetic fields, Distribution, Ducts, Iron, Coils, Induction, Electric currents, Sodium, Liquid metals, Intensity, Velocity, Fluid flow.

AD-417 763 Div. 25
(TISTP/MH) OTS price $8.10

Colorado U., Boulder.
THE THEORY, DESIGN AND DEVELOPMENT OF AN INTERFEROMETRIC SPECTROMETER.
Rept. for Jan 62-June 63,
by Richard Clayton Willson. 1 July 63, 78p.
Scientific rept. no. 1-2
Contracts AF19 604 7240 and AF19 628 287
Proj. 8627, Task 862703
AFCRL 63 688 Unclassified report

Descriptors: (*Spectrophotometers, Interferometers), Instrumentation, Theory, Prisms (Optics), Detectors, Design, Optical instruments, Data, Doppler effect.

A general introduction to the operation of interferometers and the way they are used to yield spectrometric data is presented. The theory of interferometric data acquisition and analysis is discussed in detail. Specific design problems encountered in adapting a Michelson interferometer to a rocket based experiment are discussed and their solutions are presented. The prospective research problem used as the design criterion is the measurement of the height profile (re-emission rate versus altitude) and Doppler profile of the 6300A spectral line in the night sky airglow. (Author)

26. PRODUCTION AND MANAGEMENT

AD-417 171 Div. 26
(TISTE/JWS) OTS price $1.60

Kaysam Corp. of America, Paterson, N. J.
PRODUCTION ENGINEERING MEASURE FOR MANUFACTURE OF METEOROLOGICAL BALLOONS TYPE ML-541( )/UM.
Quarterly progress rept. no. 5, 18 Apr-18 July 63,
by Murray Miner. 18 July 63, 10p.
Contract DA36 039SC85988 Unclassified report

Descriptors: (*Meteorological balloons, Manufacturing methods), (*Production, Meteorological balloons), Molding, Synthetic rubber, Automation, Positioning devices (Machinery), Cleaning, Hydraulic systems.

The head balloon dipping machine has been installed and operated semi-automatically. Improvements of the equipment are continuing to be made as necessary. These improvements will be incorporated in the design of the tail balloon dipping machine. The design of the balloon assembly machine has been initiated. The basic functions of the various components have been described. No work has been done on the conveyorized drying system. Twenty eight preproduction samples have been assembled and are awaiting testing by the government. Twelve head balloon dipping forms have been obtained, and 12 tail balloon dipping forms are in the process of procurement. (Author)

AD-417 208 Div. 26
(TISTE/AJM) OTS price $8.60

Air Force Inst. of Tech., Wright-Patterson Air Force Base, Ohio.
THE PROGRESS OF SOVIET RELIABILITY ENGINEERING: A STUDY OF PROFESSIONAL SOVIET JOURNALS,
by Paris N. Keriakou. Aug 63, 84p.
AFIT GRE Hum63 2 Unclassified report

Master's thesis.

Descriptors: (*Reliability, Engineering), (*Quality control, Tests), Periodicals, Theory, Probability, Statistics, Electronic equipment, Performance (Engineering), Tables, Sampling.

The purpose of this thesis is to evaluate the status and trends of Soviet technology in the field of reliability engineering as this function significantly affects the ability to design and manufacture reliable systems and components. The Soviet Union has placed considerable emphasis on the development of reliability engineering since about 1955. This study shows that the overall current Soviet reliability engineering capability, as revealed in open literature, lags the U. S. by three to five years. The Soviets have encountered numerous problems during the evolution of reliability engineering. They are changing their production goals from purely quantitative, to both quantitative and qualitative, in order to improve the reliability and life expectancy of the end products. It is concluded that within the next three to five years the Soviet Union will make considerable progress in the field of reliability engineering. The tendency will be to depart from the brute force techniques and to approach more sophisticated methods for achieving maximum reliability. (Author)

AD-417 223 Div. 26, 17
(TISTM/ODN) OTS price $1.10

General Dynamics, Fort Worth, Tex.
PROCESS EMBRITTLEMENT RELIEF TREATMENT FOR FLASH-ELECTROLYTIC-ELECTROLESS NICKEL PLATED 4340 (200-220 & 260-292 KSI) AND AN H-11 TOOL STEEL (250-280 KSI) EVALUATION OF,
by S. V. Glorioso. 5 Aug 63, 6p. Rept. no. FTDM3013
Contract AF33 657 11214 Unclassified report

Descriptors: (*Tool steel, Processing), (*Stainless steel, Processing), Hardness, Hydrogen embrittlement, Jet bombers, Chromium alloys, Iron alloys, Heat treatment, Tests, Data, Plating, Nickel, Tensile properties, Loading (Mechanics).

AD-417 288 Div. 26
(TISTM/EJH) OTS price $1.60

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
THE MODULAR CONTAINER UNITIZED LOAD CONCEPT. Interim rept.,
by Joseph P. Akrep. Aug 63, 12p.
QFCIAF AMXFC rept. no. 6 63 Unclassified report

Descriptors: (*Containers, Military requirements), Military requirements, Logistics, Standardization, Pallets, Transportation, Costs.

A concept is proposed for a modular container system which will furnish a low cost, expendable packaging and packing capability married to the standard 40 in. x 48 in. pallet base, and compatible with all transportation and storage media. A 5 size system is proposed ranging in cube from 1.67 to 13.34 cubic feet, to be used for preloaded shipments, TO&E packages and block loads, operation of combat type support units, organizational moves, and general purpose depot use. (Author)

AD-417 408 Div. 26, 17
(TISTM/BRW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DRAWING OF COPPER WIRE IN AN ULTRASONIC FIELD,
by V. P. Severdenko and V. V. Klubovich.
25 July 63, 6p.
FTD TT63 675 Unclassified report

Trans. from Doklady, AN SSSR, 7:2, pp. 95-98, 1963.

Descriptors: (*Copper, Wire), (*Wire, Drawing (Machine processing)), (*Drawing (Machine processing), Ultrasonic radiation), Material forming, Heat treatment, Pickling, Deformation, Tensile properties, Plasticity, Hardness.

When drawing in an ultrasonic field a copper wire with a diameter of about 1.6 mm. with compression of about 36.5%, the force of drawing decreases almost twofold in comparison with the force, obtained during the drawing of a similar wire under ordinary conditions. Ultimate strength and microhardness in the copper wire, drawn in an ultrasonic field from a diameter of 1.57 mm to a diameter of 1.25 mm (compression of about 36.5%) are approximately 15% lower than in a similar wire, drawn under ordinary conditions. (Author)

AD-417 518 Div. 26, 30
(TISTM/BRW) OTS price $7.60

SKF Industries, Inc., Philadelphia, Pa.
INFLUENCE OF LUBRICATION ON ENDURANCE OF ROLLING CONTACTS.
Summary rept. No. 1, 22 June 61-22 Mar 63.
22 Mar 63, 67p. Rept. no. AL63T011
Contract NOw61 0716, Proj. III 1
Unclassified report

Descriptors: (*Ball bearings, Lubrication). (*Lubrication, Fatigue (Mechanics)). Films, Elasticity, Hydrodynamics, Theory, Experimental data, Thickness, Surfaces, Deformation, Pressure, Electrical conductance, Tracer studies, X-ray spectroscopy, Test equipment, Bearings, Roller bearings, Mineral oils, Stresses.

A comprehensive research program to determine the effect of lubrication on the fatigue life of rolling contacts is in progress. In a rolling four-ball configuration, radioactive tracer techniques have been used to determine the existence of elastohydrodynamic lubricant films (by the absence of wear) at the contact between two 1/2 inch balls in rolling and spinning contact at various values of load, speed, and lubricant viscosity. Electrical conductivity measurements across such a contact indicate the existence of micro-contact occurrences as the hydrodynamic film becomes thinner. (Author)

AD-417 710 Div. 26, 17
(TISTM/ODN) OTS price $1.60

NARMCO Industries, Inc., San Diego, Calif.
THE INVESTIGATION OF EXOTHERMIC BRAZING OF REFRACTORY ALLOYS.
Quarterly rept. no. 3, 1 May-31 July 63,
by R. A. Long. 27 Aug 63, 12p.
Contract N600 19 59237
Unclassified report

Descriptors: (*Refractory metals and alloys, Brazing), (*Brazing, Refractory metals and alloys), (*Heat resistant metals and alloys, Brazing), Thermal joining, Shear stresses, Transition temperature, Tensile properties, Tungsten, Molybdenum, Low-temperature research, High-temperature research, Brittleness, Ductility, Heat of reaction, Niobium, Tantalum.

Shear testing of refractory alloys at elevated temperatures was performed on exothermically brazed joints of unalloyed tungsten, molybdenum, columbium, tantalum, and TZM alloy. Brittle-to-ductile transition temperature testing was performed in order to determine the effects of exothermic reaction heat on as-received unalloyed tungsten, molybdenum, and TZM alloy. (Author)

AD-417 718 Div. 26
(TISTM/AMS) OTS price $1.10

Mier, Vincent, Port Washington, N. Y.
DESICCATING BARRIERS FOR MILITARY PACKAGING.
Technical rept. no. 3, 1 May-1 Aug 63.
1 Aug 63, 4p.
Contract NOw63 0155
Unclassified report

Descriptors: (*Packaging materials, Controlled atmospheres), Transparent panels, Humidity.

The aim of this study was to develop new and superior packaging systems and materials capable of producing a dehumidified or moisture controlled atmosphere similar to that presently produced by Method II of Specification MIL-P-116D, at a lower cost and greater efficiency. The work performed involved three basic approaches: (1) A two part barrier -- one opaque, one transparent; (2) A partially transparent barrier with intermittent transparency, and (3) A completely transparent barrier material. The work is continuing along all three of the above avenues. (Author)

AD-417 775 Div. 26, 14
(TISTM/REB) OTS price $9.60

Minnesota U., Minneapolis.
TECHNICAL ASPECTS OF CONTROLLED HUMIDITY STORAGE, by C. E. Lund and M. L. Erickson. 30 June 61, 106p.
Contract NOy79585
Unclassified report

Descriptors: (*Materials, Preservation), (*Preservation, Humidity), (*Humidity, Controlled atmospheres), (*Storage, Materials), Warehouses, Degradation, Design, Moisture-proofing, Construction, Driers (Apparatus), Operation, Supply depots, Costs, Sealing compounds, Metals, Organic materials, Corrosion, Corrosion inhibition, Ships, Underground structures, Permeability, Desiccants.

The main objective of the program was to evaluate all data or information on the subject of preservation of materials in dehumidified warehouses available from Navy source, or any other source, and summarize the material into a series of reports. This is a technical report covering a summation of material included in the project progress reports primarily of interest to engineers or technical personnel interested in the design, construction, or operation of dehumidified storage spaces. (Author)

AD-417 776 Div. 26, 14
(TISTM/ODN) OTS price $7.60

Minnesota U., St. Paul.
PRESERVATION OF MATERIALS IN CONTROLLED HUMIDITY STORAGE,
by C. E. Lund and M. L. Erickson. 30 June 61, 76p.
Contract NOy 79585
Unclassified report

Descriptors: (*Storage, Materials), (*Controlled atmospheres, Storage), (*Humidity, Controlled atmospheres), Preservation, Moisture, Temperature, Degradation, Desiccants, Refrigeration systems, Metals, Plastics, Wood, Textiles, Paper, Rubber, Leather, Glass, Naval equipment, Ordnance, Aircraft, Costs.

A comprehensive study has been conducted covering the preservation of materials in controlled humidity storage. The main objective

of the program was to evaluate all data or information on the subject available from Navy sources or any other sources and summarize such material into a series of reports. These summaries were to cover all available details pertaining to the subject and to be followed by recommendations of further work necessary to cover such areas where data or information were found lacking. This report covers the nontechnical data and summarizes the information which has been made available on the program during these studies. During these studies, it has been found that in certain areas of the subject positive data are lacking while in other areas little or no data were available. However, positive information is available on the methods and costs of dehumidified storage, and studies have been initiated by the Bureau of Yards and Docks to develop positive information on efficacy and economics of dehumidified storage, and studies have been initiated by the Bureau of Yards and Docks to develop positive information on efficacy and economics of dehumidified storage of materials and equipment under the storage cognizance of that Bureau. (Author)

AD-417 778 Div. 26
(TISTA/FRL) OTS price $2.60

Minnesota U., Minneapolis.
A SURVEILLANCE MODEL: TWO MACHINE CASE,
by Vidya Sagar Taneja. Aug 63, 26p. Technical rept. no. 30
Contract Nonr710 31, Proj. NR042 003
Unclassified report

Descriptors: (*Manufacturing methods, Operations research), (*Industrial production, Processing), Management engineering, Maintenance, Visual inspection, Quality control, Probability, Equations, Economics, Mathematical models, Mathematical prediction.

Presented is an economic model for the surveillance of a production process. The process consists of a single machine with two components or of two machines. The output of the process is a single stream of goods. At each instant the distribution of the quality of the output depends on the current state of the two components. These components are assumed to be statistically independent. Considered is a ''continuous surveillance'' where it is possible to observe the production process without cost at all times of production. (Author)

27. PROPULSION SYSTEMS

AD-417 170 Div. 27, 12
(TISTA/FRL) OTS price $1.10

Rocketdyne, Canoga Park, Calif.
(No title).
Thor Informal Monthly reliability rept. for Aug 63.
16 Sep 63, 4p. Rept. no. 63RC14494
Contract AF04 695 306
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Rocket motors (Liquid propellant)), (*Rocket motors (Liquid propellant), Reliability), Captive tests, Launching, Malfunctions, Tests.

Thor engines LR79NA-11 and YLR79-NA-13 reliability estimates are presented for the period ending August 31, 1963. During the month of August there were ten valid tests, all successes. There were two launches during the month, both had satisfactory propulsion operation. (Author)

AD-417 212 Div. 27, 12, 30
(TISTW/VGW) OTS price $4.60

Rocketdyne, Canoga Park, Calif.
THOR.
Informal monthly progress rept. no. 5, Aug 63.
13 Sep 63, 26p.
Contract AF04 695 306
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Design), (*Rocket motors (Liquid propellant), Design), Research program administration, Documentation, Performance (Engineering), Tables, Rocket motor nozzles, Fuel systems, Specific impulse, Flight testing, Stability, Yaw, Fuel systems.

AD-417 505 Div. 27
(TISTA/FRL) OTS price $5.60

Jet Propulsion Center, Purdue U., Lafayette, Ind.
SUMMARY OF EXPERIMENTAL INVESTIGATIONS OF COMBUSTION PRESSURE OSCILLATIONS IN GASEOUS PROPELLANT ROCKET MOTORS.
Final rept.,
by M. J. Zucrow, J. R. Osborn and J. M. Bonnell.
June 63, 43p. Rept. no. F63 2
Contract AF49 638 756
Unclassified report

Descriptors: (*Rocket motors, Gaseous rocket propellants), (*Combustion, Rocket motors), Pressure, Oscillations, Experimental data, Configuration, Fuel injection, Fuel injectors, Combustion chambers, High frequency, Rocket research, Stability, Design, Combustion chamber gases.

The experiments conducted to study the factors promoting combustion pressure oscillations in rocket motors burning either premixed or unmixed gaseous propellants. Investigations were conducted for determining the effects of combustion chamber geometry, the chemical differences in the propellants, and also the effects of several injection variables. Auxiliary studies were conducted regarding the effects of baffles located in the combustion chambers, and the applicability of linear theories to combustion instability phenomena. (Author)

AD-417 506 Div. 27, 30, 12
(TISTP/AW) OTS price $7.60

Hercules Powder Co., Bacchus, Utah.
EMBEDMENT OF INTERNAL INSTRUMENTATION IN PROPELLANT GRAINS. WEAPON SYSTEM 133A,
by D. G. Perdue. 16 Aug 63, 56p. Rept. no. MTO270 4
Contract AF04 647 243
Unclassified report

Descriptors: (*Propellant grains, Instrumentation), Third-stage motors, Strain gages, Accelerometers, Rocket motors (Solid propellant), Casting, Solid rocket propellants, Guided missiles (Surface-to-surface).

The Gulton Industries Model TA 5201012 triaxial accelerometer was specifically developed for this embedment program, as were the triaxial strain measuring instruments discussed in this report. Their nominal sensitivity, density, and broad frequency response met program requirements. These instruments were successfully embedded within the propellant grain and should provide accurate measurements of accelerations from preselected points therein. Although these instruments were developed for use in the embedment

program, their usefulness will be realized in advance development of future motors. They will be especially valuable in testing, wherever strain and acceleration within the propellant mass is a prime factor in motor design. Instruments and cables embedded in propellant grains do not cause cracks of voids during the casting process, nor do cables and instruments enlarge or create cracks in the grain when subjected to vibration environments of less than 10g acceleration. Full-scale motors containing embedded instruments can be fired successfully, as is shown by the successful firings of the subscale motors discussed in this report. Calculations from subscale firing data indicate that a 1 percent drop below the nominal pressures of full-scale chambers could be expected. (Author)

AD-417 631 Div. 27, 25
(TISTP/MH) OTS price $2.25

Air Force Aero-Propulsion Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
IMPROVED ACOUSTICAL TREATMENT FOR ENGINE TEST STANDS,
by John T. Welbourn. June 63, 88p.
Proj. 3066, Task 30320
ASD TDR63 320 Unclassified report

Descriptors: (*Engine noise, Acoustic insulation), Test facilities, Test equipment, Noise, Structures, Experimental data, Sound, Absorption, Attenuation, Jet engine noise.

This report summarizes an investigation and test of improved materials, noise control devices, and methods of application to engine test stands for the purpose of reducing radiated noise and increasing structural durability. Included are excerpts from an acoustical survey of a modified test stand and a full report of the acoustical evaluation of experimental exhaust units for a Transportable Turbojet Engine Test Stand. Experimental work was performed at Wright-Patterson Air Force Base, Ohio. (Author)

AD-417 638 Div. 27, 17, 26
(TISTM/BRW) OTS price $15.00

Aerojet-General Corp., Downey, Calif.
EXPLOSIVE FORMING OF CLOSURES FOR LARGE SOLID PROPELLANT MOTOR CASES.
Final rept.,
by A. W. Hall, E. K. Henriksen, and I. Lieberman.
Aug 63, 217p.
Contract AF04 611 8395
Unclassified report

Descriptors: (*Rocket cases, Explosive forming), (*Steel, Material forming), Dies, Ice, Shaped charges, Rocket motors (Solid propellants), Rocket components, Welding, Metal plates, Hemispherical shells, Hardness, Tensile properties, Microstructure, Welds.

The extension of rocket motor hardware to 120-in. diameter and larger requires the development of fabrication processes to economically produce rocket motor closures in these very large diameters. The application of ice die and free-forming techniques to produce large closures by the explosive forming process is described. Problem areas associated with steel procurement, blank processing, and die fabrication are also presented in detail with recommended solutions where applicable. The successful use of welded blanks in conjunction with explosive forming is described. (Author)

AL-417 759 Div. 27
(TISTA/FRL) OTS price $4.60

Technische Hochschule, Aachen (Germany).
RESEARCH ON PHOTOELASTIC STRESS ANALYSIS FOR TURBINE DISCS WITH NOTCH INFLUENCES.
Annual rept., 1 Jan-31 Dec 58,
by Ing. K. Leist. 31 Jan 59, 1v.
Contract AF61 514 1147
Unclassified report

Descriptors: (*Turbine wheels, Photoelasticity), Design, Configuration, Tests, Stresses, Models (Simulation), Compressive properties, Scientific research, Analysis.

Research results are presented on photoelastic stress analysis for turbine disks with notch influences.

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-417 276 Div. 28
(TISTB/WA) OTS price $1.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
PREDICTION OF OFFICER JOB RANKINGS FROM RATINGS ON TWO SETS OF JOB EVALUATION FACTORS,
by Joseph M. Madden. May 63, 7p.
Proj. 7734, Task 773402
PRL TDR63 13 Unclassified report

Descriptors: (*Job analysis, Officer personnel), Military requirements, Wages, Mathematical prediction, Statistical analysis.

Rank orderings of 144 officer job descriptions made on the basis of merited pay in one case and merited grade in the other were used as criteria to validate 2 sets of job requirement factors, using a multiple regression technique. An experimental set of 10 factors predicted both criteria better than the set of 10 factors currently used by the Air Force in job evaluation. A variable which reflected the organizational level of the job increased predictive efficiency. Both sets of factors were more predictive of pay rank than of grade rank. It was suggested that some combination of both sets of factors might prove better than either one. (Author)

AD-417 277 Div. 28
(TISTB/WA) OTS price $3.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
OFFICER JOB EVALUATION IN TERMS OF MERITED PAY VERSUS MERITED GRADE,
by Joseph M. Madden. May 63, 30p.
Proj. 7734, Task 773402
PRL TDR63 12 Unclassified report

Descriptors: (*Job analysis, Officer personnel), Military requirements, Wages, Analysis of variance, Statistical distributions.

Descriptions for 144 officer jobs were ranked by captains and majors attending the Air Force Command and Staff College. These rankings were accomplished along 2 dimensions, merited grade and merited pay, using an unbalanced, incomplete block design. Significant differences between the 2 sets of rankings were observed. For instance, job descriptions for pilots of conventional aircraft, helicopters, and single engine jets are ranked substantially higher on pay than on grade. This is true to a lesser extent for

many scientific, engineering, and medical jobs. Jobs which were rated higher on grade than on pay include many of the directors and a variety of staff jobs. The results indicate that a single job evaluation plan will not be adequate for predicting both pay rankings and grade rankings. (Author)

AD-417 344 Div. 28
(TISTB/WA) OTS price $1.60

California U., Los Angeles.
ASSOCIATIVE BEHAVIOR IN NORMAL AND SCHIZOPHRENIC CHILDREN,
by Irving Maltzman, Samuel Cohen and Marigold Belloni. July 63, 13p. Technical rept. no. 11
Contract Nonr23350
Unclassified report

Descriptors: (*Verbal behavior, Analysis). (*Decision making, Training). Abnormal psychology, Children, Reaction (Psychology). Memory, Psychometrics, Stimulation.

Normal and schizophrenic children associated to high and low commonality stimulus word lists. Half the Ss within each group received repeated presentations of the first list with instructions to give a different association each time. For each presentation, scoring the associations from norms derived from one group resulted in that group showing a higher response commonality than the other. The groups did not differ significantly in the uncommonness of their associations when combined norms were employed. Response commonality among the schizophrenics was primarily the result of their repetition of the stimulus word. It was concluded that these schizophrenic children did not manifest more original associations than normal children, and that their divergent verbal behavior was a consequence of deficient orienting responses rather than extreme levels of anxiety. (Author)

AD-417 376 Div. 28
(TISTB/WA) OTS price $6.60

American Inst. for Research, Palo Alto, Calif.
LEARNING VIA PROGRAMED READING,
by Wayne Hershberger and Leslie J. Briggs. July 63, 1v. Technical rept. no. 5; AIR C28 7 63TR
Contract Nonr3077 00
Unclassified report

Original contains color plates: All DDC reproductions will be in black and white. Original may be seen in DDC Headquarters.

Descriptors: (*Reading, Behavior), (*Learning, Reading), Psychology, Psychometrics, Test construction (Psychology), Reaction (Psychology), Effectiveness, Learning.

The first part of this study reports the finding that discursively written texts programed to include (a) heterogeneous typography highlighting essential core content, and (b) self-evaluational response items quizzing the reader on the core content, were considerably more effective in teaching the essential material than discursively and tersely written texts incorporating neither program characteristic. The second part of the study reports the findings of a follow-up study designed to assess the relative effectiveness of typographical cueing versus self-evaluational responding on the learning and retention of essential lesson content in both discursively and tersely written texts. It was found that under no conditions did typographical cueing increase either the efficiency or the effectiveness of the texts. (Author)

AD-417 418 Div. 28
(TISTB/WA) OTS price $1.10

Cincinnati U., Ohio.
SHORT-TERM MEMORY AS A PREDICTOR OF TROUBLE-SHOOTING SKILLS,
by R. J. Senter and B. R. Bernstein. July 63, 6p.
Contracts AF33 616 6835 and AF33 616 7674, Proj. 1710, Task 171004
AMRL Memo. P53 Unclassified report

Report on Training, Personnel and Psychological Stress Aspects of Bioastronautics.

Descriptors: (*Memory, Performance tests), Psychology, Selection, Personnel, Wages, Reasoning, Learning, Psychometrics, Behavior.

As an adjunct to research on transfer of troubleshooting skill, a battery of tests (both standard and new) was administered to subjects in an attempt to develop tests for the selection of personnel most suited for learning to troubleshoot. This report describes one of the new tests, a test of short-term memory, and indicates its value as a predictor of learning to troubleshoot. The short-Term Memory Test consisted of 21 subtests, or sets of different items. Each subtest was studied by the subject for a specified short period, then it was removed and the subject's memory of the materials was tested. Various types of tests of memory were used, e.g. reconstruction, true-false, multiple choice, etc. Performance on the Short-Term Memory Test correlated significantly with some measures of learning to troubleshoot some equipment. Higher correlations were obtained when subjects received incentive pay for better performance on the Short-Term Memory Test. Under the condition of incentive pay, the correlations between short-term memory and learning to troubleshoot were generally comparable to the correlations obtained between learning to troubleshoot and standard tests of symbolic reasoning and verbal reasoning. (Author)

AD-417 419 Div. 28
(TISTB/WA) OTS price $1.10

Cincinnati U., Ohio.
A TEST OF TROUBLESHOOTING STRATEGY IN PAPER-PENCIL FORM,
by R. J. Senter and Frank Nairne. July 63, 7p.
Contracts AF33 616 6835 and AF33 616 7674, Proj. 1710, Task 171004
AMRL Memo. P54 Unclassified report

Report on Training, Personnel and Psychological Stress Aspects of Bioastronautics.

Descriptors: (*Performance tests, Learning), Personnel, Selection, Memory, Reliability, Decision making, Test construction (Psychology), Simulation, Psychology.

As an adjunct to research on transfer of troubleshooting skill, a paper and pencil Troubleshooting Simulation Test (TST) was developed. This test was administered to subjects in an attempt to obtain validating data regarding the potential value of such tests for the selection of personnel most suited for learning to troubleshoot. Performance on the Troubleshooting Simulation Test (TST) correlated significantly with some measures of learning to troubleshoot some equipment. Support was evidenced for the concept of a paper and pencil ''simulation of troubleshooting'' test for selecting personnel for certain troubleshooting tasks. (Author)

AD-417 424 Div. 28
(TISTB/WA) OTS price $2.60

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
BIBLIOGRAPHY ON MAINTENANCE PERSONNEL PERFORMANCE MEASUREMENT,
by William B. Askren, Jr. June 63, 19p.
AMRL Memorandum P-45 Unclassified report

Descriptors: (*Maintenance personnel, Performance tests), (*Bibliographies, Maintenance personnel), Job analysis, Electronics, Maintenance, Military personnel, Psychomotor tests, Psychometrics, Human engineering.

This report lists 116 articles related to measuring the performance of maintenance personnel. The articles are grouped into three categories of electronic maintenance, general maintenance, and general information on performance measurement. The bibliography was compiled primarily by a search of 17 different descriptors of the Defense Documentation Center, and 13 areas of the Psychological Abstracts from 1942 through 1962. Various other sources also were screened. The eleven most ''productive'' researchers in the area of performance measurement were determined by analysis of the bibliography. The distribution of references by year of publication was tabulated and graphed. (Author)

AD-417 444 Div. 28
(TISTB/WA) OTS price $3.60

Dunlap and Associates, Inc., Stamford, Conn.
SENSORY ALTERNATION AND PERFORMANCE IN A VIGILANCE TASK,
by Alin Gruber. Sep 63, 29p.
Contract AF19 628 1654
ESD TDR63 605 Unclassified report

Descriptors: (*Visual signals, Perception), (*Performance tests, Audiometry), Psychometrics, Detection, Reactions (Psychology), Psychology, Learning, Test methods.

The effects of four experimental conditions on performance in a vigilance task were studied using eight subjects in a repeated measurements design. The four conditions were: visual detection alone; auditory detection alone; combined (redundant) visual and auditory detection; and alternating, in 30-minute periods, auditory and visual detection. Subjects were required to detect .1-second, aperiodic interruptions in either or both a visually displayed horizontal line or a 1000 cps tone. The intensities of both signals were adjusted to near-threshold levels against constant noise backgrounds. Data were collected on the number of signals detected, the number of false responses, and response times during the two-hour testing session. It was found that: (1) sensory alternation was an effective means of maintaining alertness; (2) redundant, dual sense monitoring resulted in significantly fewer false responses; (3) there were no differences between the four conditions with respect to median response times; and (4) response times did increase with the length of the watch over the four conditions. (Author)

AD-417 483 Div. 28
(TISTB/AAR) OTS price $1.60

California U., Los Angeles.
THE TRAINING OF ORIGINAL PROBLEM SOLVING BEHAVIOR.
Final rept.
July 63, 11p.
Contract Nonr23350
Unclassified report

Descriptors: (*Verbal behavior, Training), (*Decision making, Training), Scientific research, Learning, Motivation, Theory.

AD-417 487 Div. 28
(TISTB/AAR) OTS price $1.10

Carnegie Inst. of Tech., Pittsburgh, Pa.
(No title).
Final technical rept., 1 Dec 62-31 Aug 63,
by Harry W. Karn. 31 Aug 63, 5p.
Contract AF49 638 770; Grant AF AFOSR197 63
AFOSR 5276 Unclassified report

Descriptors: (*Behavior, Learning), Stimulation, Statistical analysis, Perception, Scientific research, Analysis, Psychology.

AD-417 519 Div. 28
(TISTB/WA) OTS price $4.60

California U., Los Angeles.
EXPERIMENTAL STUDIES OF ASSOCIATIVE VARIABLES IN ORIGINALITY IRVING MALTZMAN, MARIGOLD BELLONI, AND MARTIN FISHBEIN,
by Irving Maltzman. July 63, 37p. Technical rept. no. 10
Contract Nonr23350
Unclassified report

Report on The Training of Original Problem Solving Behavior.

Descriptors: (*Decision making, Performance tests, Behavior, Reaction (Psychology), Stimulation, Learning, Verbal behavior, Analysis of variane, Statistical data.

A series of experiments was conducted to study associative variables that may facilitate problem solving performance on problems havng a specific correct solution. Several experiments were conducted with a group form of the two-stringproblem. It was found that prior verbal learning of relevant response sequences failed to affect problem solving performance in the predicted manner. A more extensive series of experiments was conducted employing the Remote Associates Test (RAT) of originality. Facilitation of solutions to the items was found to vary with the extent to which prompting stimuli were associated with the problem solutions. Manipulation of associative variables reliably influenced performance on the RAT. Problem solving performance on the RAT, in contrast, was relatively resistant to changes in extrinsic variables. (Author)

AD-417 565 Div. 28, 16
(TISTB/WA) OTS price $7.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
ECHOLOCATION SYSTEMS OF THE BAT CONDUCTED AT F. A. WEBSTER'S LABORATORY.
Progress rept. 1 Nov 61-1 Sep 62,
by F. A. Webster and N. I. Durlach. 14 Aug 63,
1v. Rept. no. 41G 3
Contract AF19 628 500
AFESD TDR63 105 Unclassified report

Descriptors: (*Sensory mechanisms, Bats), (*Bats, Sensory mechanisms), Biology, Sound, Behavior, Reaction (Psychology), Target discrimination, Hearing, Nervous system, Ear, Measurement, Motivation.

Division 29 - QUARTERMASTER EQUIPMENT AND SUPPLIES
Division 30 - RESEARCH AND RESEARCH EQUIPMENT

AD-417 796 Div. 28
(TISTB/WA) OTS price $12.00

Rowland and Co., Haddonfield, N. J.
ATTITUDES OF TROOPS IN THE TROPICS. VOLUME ONE. PHASE ONE.
Interim rept.,
by R. Omer Lucier, Gary L. Hart and George E. Rowland. 12 July 63, 150p. Rept. no. 63-29
Contract DA19 129qm2076(01 6146), Proj. 7X95 01 001
Unclassified report

Descriptors: (*Attitudes, Analysis), Test methods, Military personnel, Measurement, Behavior, Intelligence tests, Theory, Models (Simulations), Statistical data, Tropical regions.

This report presents the development of some methods for collection of, processing, and analyzing attitudinal data. During Phase 1 of a 2-phased research program a theory and model of attitude structure and dynamics was developed, several assessment devices were constructed, 2 pilot studies were conducted, and a major data collection program was undertaken in Panama in order to test the new attitude assessment instruments which has been developed. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-417 503 Div. 29
(TISTB/AAR) OTS price $1.60

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
A MEASURE OF THE QUALITY AND ACCEPTANCE OF BEEF LIVER. AN OBJECTIVE METHOD OF DETERMINING THE QUALITY OF BEEF LIVER. THE INFLUENCE OF COLOR AND CONFORMATION UPON THE ACCEPTANCE OF BEEF LIVER.
Interim rept., July 63,
by A. L. Savich, W. H. Surges and D. R. Bellis. Aug 63, 14p.
QFCIAF 4 63 Unclassified report

Descriptors: (*Beef, Liver), (*Meat, Acceptability), Quality control, Measurement, Food, Taste.

Two studies indicate that the grading of beef livers can be performed objectively by means of the ratio between two height measurements taken at specific points. The ratio of 0.50 between the shorter height and the taller height (Height2/Height1) was adequate to allow the selection of high quality livers. The conformation of the liver was found to be highly significant in the selection of liver for quality as indicated by taste panel preference socres. Color was insignificant in the selection of beef liver. (Author)

AD-417 578 Div. 29
(TISTM/AMS) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF VENTILATION OF CLOTHING OF CREW MEMBERS OF AIRCRAFT,
by A. A. Stasyuk, Ya. G. Rubashkin, and Yu. M. Petrov. 15 Aug 63, 4p.
FTD TT63 774 Unclassified report
Trans. from Russian Patent No. 142157, (Appl. No. 698549/40-23, pp. 1-4, 14 Feb 61,

Descriptors: (*Flight clothing, Ventilation), Pressure, High altitude.

A method is presented for ventilating the clothing of members of aircraft crews making use of drop in pressure, which is distinguished by the fact that for the purpose of simplifying the equipment of the ventilation system the air is drawn through the clothing by connecting it with an air duct from the hermetically sealed cabin and an air duct into the space outside the flying craft. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-417 110 Div. 30
(TISTB/JAB) OTS price $12.00

Defense Documentation Center, Alexandria, Va.
REPORT TO THE PRESIDENT ON GOVERNMENT CONTRACTING FOR RESEARCH AND DEVELOPMENT.
30 Apr 62, 1v.
Unclassified report

Descriptors: (*Research program administration, United States Government), Reviews, Economics, Scientific organizations, Scientific research, Control, Budgets, Management engineering, Industrial relations.

AD-417 114 Div. 30, 22
(TISTW/WH) OTS price $4.60

Naval Ordnance Lab., White Oak, Md.
A PASSIVE TEMPERATURE-TELEMETERING SYSTEM FOR GUN-LAUNCHED MODELS,
by E. Paschiutti. Sep 63, 1v.
NOL TR62 75; BR65 Unclassified report

Descriptors: (*Projectiles, Model tests), (*Guided missile models, Telemetering systems), (*Aerodynamic heating, Telemetering systems), Circuits, Gun launched.

A system was developed for telemetering surface temperature data from missile models in free flight along a ballistics range. The model contains a simple RLC circuit. The R portion is a temperature dependent film resistor. By inductive coupling, the RF energy is transmitted to and from the model as it passes pickup stations along the range. Using a 57-mm powder gun the models were launched at atmospheric conditions to muzzle velocities of between 5,170 feet per second and 5,320 feet per second. (Author)

AD-417 158 Div. 30, 6
(TISTE/JWS) OTS price $15.00

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
HIGH-PRECISION PRESSURE SENSOR.
Quarterly progress rept. no. 11, 8 May-7 Aug 63,
by Denis Cogswell, William H. Crabtree, Jerold McClure, Edward J. McKay, Jr. and Gerald E. Pollon. 7 Aug 63, 1v. Rept. no. ESL QR 181;
DSR no. 8684
Contract NOW61 0400
Unclassified report

Descriptors: (*Pressure, Measurement), (*Transducers, Pressure), (*Pressure gages, Hydrostatic pressure), Sound signals, Velocity, Liquids, Acoustic properties, Temperature, Oscillators, Synchronization (Electronics), Phase measurement.

Progress made during the quarter 8 May 1963 through 7 August 1963 toward development of a zero to 2500 psi pressure sensor having an overall precision of 1/4 psi is summarized. Present emphasis is on techniques involving sensing pressure through its effect on the velocity of sound in liquids. Laboratory model equipment is described and test results are presented which are interpreted as experimentally verifying that 1/4 psi pressure sensing via the velocity of sound is possible in the laboratory. Some general requirements for pressure sensors to be used as torpedo depth sensors are outlined and problems associated with using the velocity of sound approach are identified. Two approaches to the most fundamental problem (temperature discrimination) are described and experimental results with one of the techniques are given. (Author)

AD-417 165 Div. 30
(TISTE/WA) OTS price $3.60

Lear Siegler Inc., Santa Monica, Calif.
DEVELOPMENT OF EXPERIMENTAL GAS DISCHARGE DISPLAY.
Quarterly progress rept. no. 1, 24 May-24 Aug 63. 24 Aug 63, 26p.
Contract NObsr89201, Proj. SR0080301, Task 9498
Unclassified report

Descriptors: (*Gas discharges, Display systems), Panels (Structural), Design, Theory, Electric trigger controls, Discharge tubes, Circuits, Memory.

AD-417 180 Div. 30, 9
(TISTP/FEM) OTS price $13.00

Michigan U. Coll. of Engineering, Ann Arbor.
DEVELOPMENT AND OPERATION OF AN ARC HEATED HYPERSONIC TUNNEL,
by P. M. Sherman. July 63, 1v. Rept. no. 02953 3F
Contract Nonr122431, Proj. NR061 108; ORA Proj. 02953
Unclassified report

Descriptors: (*Hypersonic wind tunnels, Operation), (*Hypersonic flight, Simulation), (*Test facilities, Hypersonic test vehicles), Design, Stagnation point, Temperature, Pressure, Nozzles, Timing circuits, Heating elements, Heat transfer, Energy, Coils, Electric currents, Vacuum apparatus, Transducers.

AD-417 186 Div. 30
(TISTE/AM) OTS price $3.60

Stanford U., Calif.
A METHOD OF DATA ACQUISITION AND SYSTEM CONTROL THROUGH TIME SHARING OF MIXED INPUTS,
by Burden Brentnall. Feb 63, 33p.
Unclassified report

Master's thesis.

Descriptors: (*Analog-digital computers, Design), Programming (Computers), Circuits, Electronic equipment, Scanning, Amplifiers, Performance (Engineering).

AD-417 193 Div. 30, 25
(TISTP/WH) OTS price $5.60

Marine Engineering Lab., Annapolis, Md.
A SYSTEM OF AUTOMATIC CONTOUR DISPLAY (AUTOCON),
by W. W. Anderson. 11 Sep 63, 1v.
Subproj. S R011 01 01
MEL Research and development rept. no. 81 284
Unclassified report

Report on In-House Independent Research Program.

Descriptors: (*Analog systems, Display systems), (*Magnetic fields, Measurement), Television display systems, Magnetometers, Scanning, Circuits.

A newly developed system of Automatic Contour Display, entitled AUTOCON, receives analog information from a plane of equally spaced data points and simultaneously converts this information into complete contour response surface plots. The system employs a series of analog storage, scanning, and interpolation operations which take a finite number of data points in a plane and, from them, generate an interpolated surface over all these points. As the surface is generated, it is quantized into discrete contour levels which are then drawn on a stored television display for immediate use and on 35-mm film for a permanent record. The present AUTOCON system can accept individual data points at a rate of ten readings per second and will plot a contour consisting of eleven, electronically-identified, distinct, contour levels. The complete system, as well as certain individual portions, is generally applicable to any area of investigation which uses contour-response surface plots or similar displays as a method of graphical analysis. The system's chief advantage in its present use of stray magnetic field investigations is the elimination of the time required to obtain contour displays of 1 or 2 hr by manual plotting. (Author)

AD-417 350 Div. 30
(TISTB/AAR) OTS price $11.00

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
A SYNTAX-ORIENTED COMPILER FOR LANGUAGES WHOSE SYNTAX IS EXPRESSIBLE IN BACKUS NORMAL FORM. AND SOME PROPOSED EXTENSIONS THERETO.
by Peter Zilahy Ingerman. May 63, 1v.
AFOSR 5283 Unclassified report

Master's thesis.

Descriptors: (*Language, Machine translation). (*Machine translation, Language). Computers, Structures, Digital computers, Coding, Automatic, Programming languages.

This paper discusses a syntax-oriented compiler for languages with a context-free syntax expressed in Backus Normal Form. The technique discussed is applicable to an iterated compilation process, where each phase of the compilation generates the rules of syntax required for the next phase of the compilation. Complete flow charts are included for the major processors; these flow charts are essentially machine-independent. Also included is a discussion of the extensions required which allow the compilation technique to be extended to context-dependent syntax, although a non-terminating compilation may result in certain cases if these extensions are included. The general technique is therefore not only shown to be extendable, but is also shown to facilitate the comparison of languages, since the idiosyncracies of individual compilers can be eliminated from the comparison. (Author)

Division 30 - RESEARCH AND RESEARCH EQUIPMENT

AD-417 385 Div. 30
(TISTB/AAR) OTS price $1.10

Hughes Aircraft Co., Culver City, Calif.
(No title).
Monthly progress rept. no. 10, 29 July-25 Aug 63.
26 Aug 63, 6p.
Contract AF04 695 210
Unclassified report

Descriptors: (*Computers, Reliability), Errors, Multiple operation, Programming (Computers), Test.

AD-417 426 Div. 30
(TISTB/AAR) OTS price $4.60

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson Air Force Base, Ohio.
INSTRUCTIONS FOR FABRICATING A DIGITAL LABORATORY TIMER,
by Nilss M. Aume. July 63, 41p.
AMRL Memo. P38 Unclassified report

Descriptors: (*Timing devices, Laboratories), (*Digital systems, Timing devices), Design, Construction, Electric motors, Human engineering.

This report describes the design and fabrication of a digital timer that is useful in a wide variety of experimental applications, e.g., in studies that require each member of a group of human subjects to monitor and/or record time as a part of his experimental task. The design of the timer is relatively simple, and the instructions for its fabrication are thorough. (Author)

AD-417 489 Div. 30, 2, 25
(TISTM/EJH) OTS price $1.10

Laboratory of Astrophysics and Physical Meteorology, Johns Hopkins U., Baltimore, Md.
FAR INFRARED SPECTROSCOPY.
Final rept.,
by John Strong. 28 Aug 63. 1p.
Grants AF AFOSR62 135 and AF AFOSR62 135A, Proj. 9768, Task 37650
AFOSR 5279 Unclassified report

Descriptors: (*Infrared spectroscopy, Astronomy), (*Infrared spectrophotometers, Astronomy), Instrumentation, Balloon equipment, High altitude, Astronomical data, Sun, Moon.

The purpose of the program has been to develop interferometric spectroscopy for the far infrared spectrum so that it may, among other uses, be used to study the spectrum of the sun (and moon, during eclipse) from balloon altitudes. During the first part of this program the research results obtained with a Rubens-Wood quartz-lens focal isolation apparatus. The focal isolation apparatus was itself modified, but the most attention was given to detectors for use with it. A Golay cell, provided with diamond window, and a Barnes thermistor were used. (Author)

AD-417 523 Div. 30
(TISTP/MG) OTS price $5.60

Frick Chemical Lab., Princeton U., N. J.
ROBAN CRYSTALLOGRAPHIC MONITOR SYSTEM,
by R. A. Jacobson and A. D. Mighell. 26 June 63, 46p. Technical rept. no. 2
Grant DA AROD31 124G265, Proj. 3083C
Unclassified report

Descriptors: (*Programming (Computers), Crystal structure), (*Crystal structure, Programming (Computer)), (*Programming (Language), X-ray diffraction analysis), X rays, Computers, Monitors, Magnetic tape, Input-output devices, Errors, Command and control systems, Models.

Roban is a versatile monitor system, for the Control Data Corporation 1604 computer, designed specifically for the X-ray crystallographer. It was written to make computer operation both easy and efficient. By using Roban and auxiliary programs, it is possible to assemble and debug new programs, and to operate existing programs. Roban contains an integrated control over a system of commands (macro-instructions). These Roban commands make it possible to easily read or write on magnetic tape in binary coded mode, to dump a specific number of storage locations in binary coded decimal mode, to rewind tapes, etc. Other features of this monitor system include a flexible input-output system, a debugging capacity, the ability to monitor certain arithmetic errors, some useful arithmetic subroutines, and finally the capacity to work in conjunction with other programs such as the trace and assembly routines. (Author)

AD-417 539 Div. 30
(TISTA/LSK)) OTS price $3.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
SPECTRUM OF THE PROBE GLOW IN A SUPERSONIC WIND TUNNEL LIGHTNING STORM.
by Anders S. Platou, Gerald B. Klebe and Robert L. Rowe. July 63, 45p.
BRL Memo. rept. no. 1490
Unclassified report

Descriptors: (*Supersonic wind tunnels, Lightning), (*Wind tunnel nozzles, Water vapor), Supersonic nozzles, Electric arcs, Glow discharges, Electric discharges, Static electricity, Static dischargers, Condensation, Spikes, Spectroscopy, Spectra (Visible & ultraviolet.

When moist air is used in a supersonic nozzle, electrical effects are observed on a probe mounted in the nozzle. An ungrounded probe assumes a potential of several thousand volts; with a grounded probe, a blue-red glow appears on the tip. Emission spectra of this glow consist only of excited molecular nitrogen with no indication of the presnce of oxygen or or water. The condensation glow spectra are similar to those of a low power a.c. arc under similar static pressure. (Author)

AD-417 541 Div. 30
(TISTM/AMS) OTS price $2.00

Electro-Optical Systems, Inc., Pasadena, Calif.
RESEARCH ON HIGH TEMPERATURE STRAIN GAGE ELEMENTS.
Final rept.,
by C. B. Jordan. Aug 63, 71p.
Contract AF33 657 8869, Proj. 7065, Task 7065 02
ARL 63 147 Unclassified report

Descriptors: (*Strain gages, High-temperature research), (*High-temperature research, Strain gages), (*Materials, Strain gages), Silicon compounds, Carbides, Silicon, Pyrolytic graphite, Gallium compounds, Phosphides, Titanium compounds, Oxides, Crystals, Crystal growth, Single crystals, Piezoelectric effect, Resistance (Electrical), Laboratory equipment.

This project was concerned with an attempt to

find materials for use as strain gages at temperatures above 2000 F (1093 C). Five materials were investigated: silicon carbide, silicon, pyrolytic graphite, rutile, and gallium phosphide. The gage factors of these materials were measured in the temperature range of 25 C (77 F) to 750 C (1382 F). The gage factor of silicon carbide was found to be very small even at room temperature, and none of the other materials appeared to offer any possibility of retaining a useful gage factor at 2000 F. However, several results which may well be of practical value were obtained: the usefulness of silicon as a strain gage was extended to about 650 C (1202 F) by a new contacting process, silicon carbide was found to be a good temperature sensor over a wide range of temperature, and rutile was found to be a good oxygen sensor over a fairly wide range of elevated temperature. (Author)

AD-417 552 Div. 30
(TISTE/JWS) OTS price $10.50

Ordnance Research Lab., Pennsylvania State, U., University Park.
UNDERWATER SOUND RAYS AND TRANSMISSION LOSS USING AN ANALOG COMPUTER,
by E. Lugo-Faria. 14 Aug 63, 123p. Technical memo. no. TM26 2000 72
Contract Nord16597
Unclassified report

Descriptors: (*Programming (Computers), Analog computers), (*Sound transmission, Underwater sound), Ranges (Distance), Equations, Absorption, Velocity, Mathematical prediction.

A presentation is made of the steps followed in the development of an analog computer program which is used to generate sound raypaths and to compute sound transmission losses due to ray divergence and absorption. Inputs to the program are: sound projector depth, velocity of sound at this depth, and velocity gradient as a function of depth only. The implemented equations are briefly described together with the approximations used. Simplified block and schematic diagrams are shown to describe the logical development of the program and to clarify points under discussion. Typical plots of raypaths, intensity contours, and depth dependence of the sound velocity are presented along with some discussion as to computer sensitivity and accuracy of results. Approximations to the implemented equations and the accompanying simplifications resulting are discussed from the standpoint of accuracy. A set of operating instructions pertinent to an Electronic Associate Analog Computer Model 16-31R when using the resulting program is included in Appendix A. (Author)

AD-417 644 Div. 30
(TISTP/HG) OTS price $26.00

California U., Los Angeles.
CONTENT-ADDRESSABLE MEMORY SYSTEMS,
by Richard H. Fuller. June 63, 549p. Rept. no. 63 25
Contract Nonr23352
Unclassified report

Descriptors: (*Computer storage devices, Effectiveness), Data processing systems, Digital computers), Computer logic, Programming languages, Simulation, Cyrogenic storage devices, Control sequences, Magnetic core storage, Data storage systems, Programming (Computers), Tunnel diodes, Thin films, Air traffic control systems, Tables, Dynamic programming, Information retrieval, Switching circuits, Functions, Partial differential equations, Difference equations.

The utility of content-addressable memories (CAM's) within a general purpose computing system is investigated. Word cells within CAM may be addressed by the character of all or a part of cell contents. Multimembered sets of word cells may be addressed simultaneously. The distributed logical capabilities of CAM are extended to allow simultaneous transformation of multimembered sets and to allow communication between neighboring word cells. A novel set of logical and arithmetic commands is proposed for the extended CAM and algorithms are given for execution of these commands. A simulation package is developed which allows simulation of CAM commands within job programs run on the IBM 7090 and derives tallies of execution times corresponding to a particular realization of a CAM system. (Author)

AD-417 672 Div. 30
(TISTB/AAR) OTS price $2.60

Lincoln Lab., Mass, Inst. of Tech., Lexington.
DATA SYSTEMS. DIVISION 2.
Quarterly progress rept., 1 May-31 July 63.
15 Aug 63, 10p.
Contract AF19 628 500
AFESD TDR63 Unclassified report

Descriptors: (*Data processing systems, Computers), (*Computers, Data processing systems), Circuits, Switching circuits, Transistors, Memory, Electronics, Measurement, Automatic, Speech, Speech reocgnition, Digital systems, Design, Control.

AD-417 773 Div. 30, 26
(TISTE/CAM) OTS price $1.60

SKF Industries Inc., Philadelphia, Pa.
CALIBRATION OF ANDEROMETERS.
Final rept.,
by Olof Gustafsson. 13 Aug 62, 15p. Rept. no. AL62L015
Contract NObs78593, Proj. CR01
Unclassified report

Descriptors: (*Test sets, Calibration), Vibration, Measurement, Bearing, Test methods.

AD-417 784 Div. 30
(TISTP/FR) OTS price $1.10

Denver U., Colo.
(No title).
Progress letter no. 25, 1-31 Oct 62.
31 Oct 62, 2p.
Contract AF19 604 7429
Unclassified report

Descriptors: (*Meteorological balloons, Instrumentation), Spectrum analyzers, Attitude control systems.

31. SHIPS AND MARINE EQUIPMENT

AD-417 203 Div. 31
(TISTE/OHD) OTS price $8.10

Naval Civil Engineering Lab., Port Hueneme, Calif.
SEA TESTS ON A SWING-MOORED AIRCRAFT CARRIER.

Final rept.,
by J. T. O'Brien and B. J. Muga. 9 Sep 63, 78p.
Proj. Y R009 03 001
NCEL R251 Unclassified report

Descriptors: (*Mooring, Aircraft carriers), Motion, Acceleration, Wind, Roll, Pitch (Motion), Water waves, Measurement, Recording systems, Experimental data.

Sea tests involving motions and forces were conducted on the CVU-91, a deactivated Casablanca-class aircraft carrier. The ship was swing-moored by a 2-1/2-inch die-lock chain in about 372 feet of water in the Pacific off Southern California. Water-level variations, ship rotations and accelerations, mooring force, and wind velocity and direction were measured in sea states of 5 and 6. Two records, of 34 minutes each, were analyzed, using time-series techniques to relate the motions and forces to the water-level variations. Apparent amplitude response operators were obtained for all the ship motions and the mooring force. It was concluded that the mooring chain was loaded lightly and affected only fishtailing; test- and model-derived response operators for pitch and roll agree well over a limited range; heave and pitch can be deduced by separation of measurements of acceleration made at bow and stern. (Author)

AD-417 463 Div. 31, 18, 8
(TISTE/CAM) OTS price $18.50

Sperry Gyroscope Co., Great Neck, N. Y.
PROJECT SURIC. PHASE V. VOLUME II.
Final rept.
July 63, 1v. Sperry rept. no. EB5280 0308
Contract NOnr2855 00
Unclassified report

Descriptors: (*Combat information centers, Naval vessels (Combatant)), (*Command and control systems, Navigation), (*Performance (Engineering), Specification), Specifications, Navigation computers, Electronic equipment, Data processing systems, Display systems.

AD-417 516 Div. 31, 9
(TISTE/JBM) OTS price $6.60

Hydronautics, Inc., Laurel, Md.
WAVES DUE TO A SUBMERGED BODY,
by B. Yim. May 63, 1v. Technical rept. 231 3
Contract Nonr368800, Proj. NR220 016
Unclassified report

Descriptors: (*Underwater objects, Water waves), (*Water waves, Underwater objects), (*Submarines, Water waves), Mathematical analysis, Motion, Ocean waves, Hydrodynamics, Stability, Integral transforms, Equations, Analysis, Velocity.

An investigation was made of the wave height due to a submerged point source and a source line. The wave height consists of two parts; the regular wave and the local disturbance. The method of evaluating the integral representing regular waves is different in two regions, that in the vicinity and that far behind the singularity. In the vicinity of the singularity, the numberical integration is performed by the method of Gauss' quadrature. At the far place, the method of stationary phase is used. The behavior of the wave height near the critical line is discussed. For the local disturbance, the integral can be evaluated in the closed form immediately above the singularity. A scheme involving numerical computation by high speed machine is worked out for other points. As an example, the wave height due to a simple form of submarine with given dimensions is calculated in detail. The influence of the submarine sail is included. (Author)

AD-417 554 Div. 31, 18
(TISTE/JWS) OTS price $14.00

Mathiasen's Tanker Industries, Inc., Philadelphia, Pa.
DOWN RANGE SUPPLY VESSEL - REVISED.
30 Nov 62, 158p.
Unclassified report

Subcontract to Lincoln Lab., Mass. Inst. of Tech., Contract AF19 604 7400.

Descriptors: (*Refueling, Ships), (*Naval vessels (Support), Refueling), Tenders (Vessels), Guided missile ranges, Logistics, Hose couplings, Line throwing equipment, Costs.

Contents:
Historical background of replenishment at sea
Concept of replenishment at sea and at safe anchorage
Operational procedures
Replenishment methods and instructions
High-line methods of transferring supplies
High-line methods of transferring personnel
Transfer by motor launch
Log abstract of refueling at sea operations
Transfer of technical personnel and data
Scope of service required
Areas of operation
Prevailing weather conditions
Replenishment ports
Prototypes of suitable supply vessels
Procurement of supply vessel
Reactivation and conversion of supply vessel
Down range supply vessel
Tracking vessels
Operating costs
Installation of refueling station at Ascension Island
Pacific Missile Range Operations
Human engineering

AD-417 630 Div. 31, 15
(TISTE/JWS) OTS price $4.60

Institute of Engineering Research, U. of Calif., Berkeley.
SHIPS OF MINIMUM TOTAL RESISTANCE,
by Wen-Chin Lin, W. C. Webster and J. V. Wehausen. Aug 63, 1v. Rept. no. NA63 7
Contract Nonr22230
Unclassified report

Descriptors: (*Ships, Design), (*Fluid dynamic properties, Ships), Ship hulls, Hydrodynamic configurations, Functions, Taylor's series, Numerical analysis, Partial differential equations, Ship models.

32. MISCELLANEOUS ARTS AND SCIENCES

AD-417 129 Div. 32
(TISTB/WA) OTS price $7.60

Middlebury College, Vt.
MARINE ORIENTATION IN NORWAY. AN ASSESSMENT OF THE ROLE OF THE SEA IN THE LIFE OF THE COUNTRY.
Final rept.,
by Vincent H. Malmstrom. Aug 63, 67p.
Grant Nonr G00049 62, Proj. NR388 068
Unclassified report

Descriptors: (*Commerce, Industrial research), Agriculture, Population, Economy, Labor, Industries, Distribution, Oceans.

This report has two primary objectives, namely (1) to determine the degree of marine orientation in Norway, and (2) to explain insofar as possible such regional variations in marine orientation as are disclosed by the data assembled. Norway was chosen as the locale of this pilot study for several reasons, foremost among them being (a) a long and well-established tradition of maritime activity and (b) a homogeneous cultural milieu, thus reducing the number of variables to essentially those presented by the physical environment. (Author)

AD-417 188 Div. 32
(TISTB/WA) OTS price $2.60

Hebrew U., (Israel).
SYNTACTIC SIMPLICATION,
by A. Kasher and D. Louvish. Aug 63, 21p.
Technical rept. no. 14
Contract N62558 3510, Proj. NR049 130
Unclassified report

Descriptors: (*Language, Mathematical analysis), (*Mathematical analysis, Language), Numbers, Functional analysis, Algebras.

AD-417 356 Div. 32, 30, 5
(TISTB/WA) OTS price $7.60

Royal Inst. of Tech. (Sweden).
SPEECH ANALYSIS TECHNIQUES.
Final technical rept. no. 4, 1 July 62-30 June 63.
30 June 63, 1v.
Contract DA91 591EUC2626
Unclassified report

Descriptors: (*Speech, Analysis), Speech compression, Data processing systems, Spectrum analyzers, Speech recognition, Digital systems, Mathematical analysis.

This study has concentrated on speech analysis techniques with particular emphasis on instrumentation and methods for automatic extraction of speech signal parameters. There is also a limited amount of work undertaken on synthesis instrumentation and techniques. Of particular interest to speech bandwidth compression techniques is a study of the performance of speech compression systems. (Author)

AD-417 452 Div. 32
(TISTB/AAR) OTS price $3.60

Planning Research Corp., Los Angeles, Calif.
DOCUMENT STORAGE AND RETRIEVAL TECHNIQUES -- APPENDIX -- INDEXING TECHNIQUES, DESCRIPTION AND BACKGROUND,
by Donald V. Black. Rev. 13 June 63, 29p. Rept. no. PRC D634A
Unclassified report

Appendix to Navcossact - Report no. 0024.

Descriptors: (*Information retrieval, Data processing systems), Data storage systems, Navy, Documentation, Economics, Nuclear physics, Catalogs, Classification, Mathematics, Physics, Chemistry, Automatic.

AD-417 470 Div. 32
(TISTB/AAR) OTS price $2.60

Hebrew U. (Israel).
MEASURES OF SYNTACTIC COMPLEXITY,
by Y. Bar-Hillel, A. Kasher and E. Shamir.
Aug 63, 26p. Technical rept. no. 13
Contract N62558 3510, Proj. NR049130
Unclassified report

Descriptors: (*Language, Vocabulary), Mathematics, Functions, Structures, Automation.

AD-417 471 Div. 32, 2, 16
(TISTB/AAR) OTS price $7.60

Middlebury Coll., Vt.
MARINE ORIENTATION IN NORWAY -- AN ASSESSMENT OF THE ROLE OF THE SEA IN THE LIFE OF THE COUNTRY.
Final rept.,
by Vincent H. Malmstrom. Aug 63, 67p.
Grant Nonr G00049 62, Proj. NR388068
Unclassified report

Descriptors: (*Fishes, Industries), (*Industries, Fishes), Economics, Distribution, Agriculture, Geographical survey.

AD-417 681 Div. 32, 20
(TISTM/BRW) OTS price $4.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST. ABSTRACTS. PART I.
Rept. for 1-30 Sep 63.
15 Oct 63, 48p. REIC Ascensions list no. 68
Contract AF33 657 10085, Projs 7381 and 7634, Task 738103
Unclassified report

Descriptors: (*Bibliographies, Radiation damage), (*Radiation damage, Bibliographies), Metals, Alloys, Ceramic materials, Polymers, Inorganic compounds, Organic materials, Electronic equipment, Electronics, Space environmental conditions, Abstracts, Elastomers, Plastics.

AD-417 696 Div. 32, 15
(TISTP/HG) OTS price $2.60

New York State Coll. of Agriculture, Cornell U., Ithaca.
SOME ASPECTS OF GENERAL AND SPECIFIC COMBINING ABILITY,
by W. T. Federer and C. R. Henderson. 1963, 21p.
Technical rept. no. 8
Contract Nonr40139, Proj. NR042 212
Unclassified report

Descriptors: (*Plants, Genetics), (*Statistical analysis, Genetics), (*Genetics, Plants), Analysis of variance, Equations, Mathematical models, Mathematical prediction, Sampling, Stochastic processes, Reproduction, Bibliographies.

For the diallel crossing system involving $p(p-1)/2$ possible crosses among p lines, the linear yield equation, the estimated effects, the sums of squares in the analysis of variance, and the expected values for the various sums of squares under different models are described. A number of different definitions or models are given for both fixed and random genetic effects. Under these descriptions, it is shown how to obtain the several published forms of the expectations for the sums of squares among the estimated combining ability effects for the ith line. Thus, all published forms are correct, but different models or definitions were utilized to obtain each form. The specific combining ability variance for the ith line is redefined in such a manner as to make the genotypic variance in the absence of epistatic effects, equal to twice the sum of the general combining ability variance

(additive variance = the square of sigma sub alpha) and the specific combining ability variance (non-additive variance = the square of sigma sub alpha). The currently used definition of specific combining ability variance requires that the genotypic variance be 2 the square of sigma sub alpha + the square of sigma sub alpha rather than the redefined form of 2(the square of sigma sub alpha + the square of sigma sub alpha) as suggested herein. (Author)

33. TRANSPORTATION

AD-417 202 Div. 33, 19
(TISTA/FRL) OTS price $14.50

Airborne Instruments Lab. Inc., Deer Park, N. Y.
OPERATIONAL EVALUATION OF AIRPORT RUNWAY DESIGN AND CAPACITY (A STUDY OF METHODS AND TECHNIQUES), by E. N. Hooton, H. P. Galliher, M. A. Warskow and K. G. Grossman. Jan 63, 214p. Rept. no. 7601 6
Contract FAA BRD136, Proj. 412 7 1R
Unclassified report

Descriptors: (*Runways, Design), (*Terminal flight facilities, Design), (*Air traffic, Scheduling), Mathematical models, Configuration, Programming (Computers), Airports, Civil aviation, Air traffic control systems, Handbook, Landings, Research program administration, Operation.

Described is a continuation of research into the application of mathematical techniques to the evaluation of practical airport capacity and delays. Since the primary task was to develop a handbook for determining airport capacity and delays by the engineer in the field, the main effort was concentrated on developing existing mathematical models for universal application. Therefore, this report contains the background material relevant to the handbook, describes the mathematical models used, and discusses the preparation of their respective inputs. These inputs vary with runway configuration, runway use, aircraft population, and operating rules (VFR or IFR). The airport surveys that were analyzed to provide input values and operating parameters are also described. An IBM 7090 Fortran program was written to automatically compute the inputs and model outputs in the form of delays versus operating rates and capacities of airport runway configurations. The use and application of this program is described. (Author)

AD-417 447 Div. 33, 7, 19
(TISTA/VGW) OTS price $2.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
A BUILDING BLOCKS CONCEPT FOR VFR AIRPORT LIGHTING.
Interim memorandum rept.,
by Theodore W. Robinson and Robert K. McKelvey.
June 63, 16p.
Proj. 421 16R
Unclassified report

Descriptors: (*Airports, Lighting equipment), Approved lights, Beacon lights, Marker lights, Glide path systems, Aviation safety, Night landings, Civil aviation, Scheduling, Landing aids, Construction.

This report describes a model schedule for the gradual augmentation of a VFR airport lighting system such that each component added to the basic configuration represents an operationally important gain in guidance value. The schedule is characterized as a building blocks approach to system evolution adjusted on the one hand to operational requirements and resources and on the other hand to the state of the art in equipment development. Where it is not possible to bring the two together, suggestions are added for future work. (Author)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterisk are included in the subject index.

BIBLIOGRAPHY

PB-163 664 OTS $6.00/reel
$70.00/set of reels
Patent Office, Washington, D. C.
PATENT CLASSIFICATION MICROFILM.
[1963] 13 microfilm reels, 3,000,000 patents
Supersedes listing of 1960, PB-144 504

DESCRIPTORS: *Patents, Classification, Documentation,

This microfilm copy of the official record of the classification of U. S. patents issued through 31 Dec 62 is arranged numerically in Class and Subclass order according to the Patent Office Manual of Classification. The microfilm listing, used in conjunction with the manual, makes it possible to find out which patents relate to a given subject classified in a particular numbered class and subclass. The complete record is contained in 13 reels of 16 mm film comprising 6 reels of the original or primary subject classification of the patents, and 7 reels of their cross reference classification.

Orignial Classification
Reel no. 1, Patent Classes 1-53
Reel no. 2, Patent Classes 54-105
Reel no. 3, Patent Classes 106-159
Reel no. 4, Patent Classes 160-217
Reel no. 5, Patent Classes 218-267
Reel no. 6, Patent Classes 268-346
Cross Reference Classification
Reel no. 7, Patent Classes 1-58
Reel no. 8, Patent Classes 59-106
Reel no. 9, Patent Classes 107-161
Reel no. 10, Patent Classes 162-212
Reel no. 11, Patent Classes 213-259
Reel no. 12, Patent Classes 260-312
Reel no. 13, Patent Classes 313-346

PB-163 665 OTS $6.00

Patent Office, Washington, D. C.
PATENT CLASSIFICATION MICROFILM. CLASSIFICATION OF DESIGN PATENTS.
[1963] 1 microfilm reel
Supersedes reel of 1960, PB-144 625

DESCRIPTORS: *Patents, Design, Classification, Documentation,

The complete record of the classification of design patents is contained in a single microfilm reel (16 mm) which includes both the original and cross reference classification of these patents. (See also PB-163 664)

BEHAVIORAL SCIENCES

Personnel and Training

AD-400 727 OTS $6.60

Applied Psychological Services, Wayne, Pa.
POST-TRAINING PERFORMANCE CRITERION DEVELOPMENT AND APPLICATION: A COMPARATIVE MULTIDIMENSIONAL SCALING ANALYSIS OF THE TASKS PERFORMED BY NAVAL AVIATION ELECTRONICS TECHNICIANS AT TWO JOB LEVELS
Arthur I. Siegel and Douglas G. Schultz. Mar 63, 63p refs
Contract Nonr-2279(00)

DESCRIPTORS: *Performance tests, *Job analysis, *Aviation personnel, *Naval personnel, Psychometrics

This study investigated the application of multidimensional scaling methods in the area of job performance. Supervisory personnel judged the similarity among all pairs of 29 tasks which had been designated as constituting the job of the Naval aviation electronics technician supervisor. The resulting scaled similarity estimates were analyzed by multidimensional scaling techniques. This research supplemented an earlier study by providing further evidence that it is feasible and fruitful to apply multidimensional scaling methods to Naval job performance. Chief petty officers and petty officers, first class, in the aviation electronics technician rating perceived their work as involving nine basic dimensions, including all the dimensions underlying the job of strikers and petty officers, third class, in the rating. (Author)

Y-1442 OTS $2.00

Union Carbide Nuclear Co., Oak Ridge, Tenn.
A COMPARISON OF COMPLETE VERSUS SELECTIVE PROGRAMMED INSTRUCTION IN A NONDESTRUCTIVE TESTING LABORATORY
R. T. Bell. 21 Jun 63, 76p refs
Contract W7405-eng-26

Psychology

AD-402 088 OTS $2.60

Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
CHIMPANZEE PERFORMANCE ON A CONTINUOUS AVOIDANCE TASK DURING ACCELERATION AT SUSTAINED LOW LEVELS
Donald N. Farrer, Marvin E. Grunzke, Gregg A. Gilbert, Gary T. Barnhart, and Paul D. Jacobs. Mar 63, 26p refs
ARL-TDR-63-6

DESCRIPTORS: *Performance tests, *Acceleration, *Primates, Heart, Respiration, Body temperature.

Chimpanzee performance during 1 G, 2 G and 4 G was evaluated with a pilot study (one subject) and a cross-over design (four subjects). Each test lasted 90 minutes (30 minutes at 1 G; 30 minutes at either 2 G or 4 G; 30 minutes at 1 G). Performance, heart rate, respiration rate and body temperature were monitored. It was concluded that a performance decrement results during exposure to 4 G (chest to back, $+G_x$) for 30 minutes. The heart rate was high throughout all tests, but it increases while the subject monitors the cue lights and decreases during rest periods. The respiration rate does not consistently change as a function of either G force or work. Body temperature consistently decreased during the tests. (Author)

AD-403 763 OTS $1.60

Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
A MULTIPLE AVOIDANCE SCHEDULE FOR MEASURING TEMPORAL PROCESSES IN THE CHIMPANZEE
Herbert H. Reynolds, Victor Bogo, and Frederick H. Rohles. Apr 63, 13p refs
ARL-TDR-63-8; N63-15666

DESCRIPTORS: *Performance tests, *Primates, Reaction (Psychology), Shock (Pathology).

A three component multiple shock avoidance schedule for measuring different types of temporal discrimination is described and data are presented for a chimpanzee. On the first component, FR-1 (15"-30") avoid, shock can be avoided by delaying a single response until between the 15th and 30th second after the presentation of a cue light; in the second component, FR-20 (0"-20") avoid, shock can be avoided by making 20 lever presses within 20 seconds; and in the third component FR-1 (0"-2") avoid, shock can be avoided by making one lever press within 2 seconds after the presentation of a visual cue. (Author)

BIOLOGICAL SCIENCES

AD-295 604 OTS $1.60

Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
DIURNAL TEMPERATURE CHANGES IN A CHIMPANZEE DURING A 14-DAY RESTRAINT TEST
Frederick H. Rohles, Jr., Herbert H. Reynolds, and Carroll Brown. Jan 63, 12p refs
ARL-TDR-63-2

DESCRIPTORS: *Body temperature, *Primates, *Performance tests, Space flight.

This report is a supplement to a previously published study entitled, "A Laboratory Model for a 14-Day Orbital Flight with a Chimpanzee". By more detailed analysis of the skin temperature data during the first 6 days of the test, it was found in 5 of the 6 days that mean skin temperatures obtained between midnight and 7:45 a.m. (Period A) were statistically different from those obtained between 8:00 a.m. and 3:45 p.m. (Period B) and between 4:00 p.m. and 11:45 p.m. (Period C), and that means between Periods B and C were also statistically different. (Author)

PB-163 861 OTS $8.10

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
NATIONAL STOCKPILE OF BLOOD ITEMS
Claude L. Hooker (Master's thesis). Jun 63, 99p refs
Rept. no. SLSR-11-63

DESCRIPTORS: *Blood, Storage, *Logistics, Disasters, Civil defense systems.

The purpose of this paper is to make a study and evaluation of selected blood items of the National Stockpile of Blood Items in order to determine the optimal way of acquiring and maintaining the blood items necessary for civil defense and disasters.

TID-15534 OTS $3.60

Argonne National Lab., Ill.
MASS CULTIVATION OF ALGAE IN PURE HEAVY WATER
Homer Daboll, Henry L. Crespi, and Joseph J. Katz. Feb 62, 31p refs
Contract W31-109-eng-38
UAC-6139

UCRL-10898 OTS $2.75

Lawrence Radiation Lab., Univ. of California, Berkeley.
THE ELECTRIC CHARGE AND SURFACE PROPERTIES OF INTACT CELLS
Robert M. Glaeser. 30 Jul 63, 165p refs
Contract W7405-eng-48

UCRL-10951 OTS $2.75

Lawrence Radiation Lab., Univ. of California, Berkeley.
SOME NEW MOLECULAR BIOLOGY OF CHLOROPHYLL-A
Alexander Farquhar Hill Anderson. Aug 63, 152p refs
Contract W7405-eng-48

LF-10 OTS $0.50

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
THE DEVELOPMENT OF A CONTINUOUS CELL LINE FROM NORMAL DOG LIVER AND ITS SUSCEPTIBILITY TO VIRUSES. Technical progress rept.
Frank F. Pindak and William E. Clapper. Aug 63, 24p refs
Contract AT(29-2)1013

N63-20754 OTS $2.25

Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
SELECTION OF SPACE CABIN ATMOSPHERES. PART I: OXYGEN TOXICITY
Emmanuel M. Roth. Aug 63, 94p refs
Contract NASr-115
Technical note D-2008

Biochemistry

UCRL-10934 OTS $2.50

Lawrence Radiation Lab., Univ. of California, Berkeley.
BIO-ORGANIC CHEMISTRY. Quarterly rept. Mar-May 63.
29 Jul 63, 146p refs
Contract W7405-eng-48

LA-2964 OTS $1.00

Los Alamos Scientific Lab., N. Mex.
THE APPLICATION OF AUTOMATIC COMPUTATIONAL TECHNIQUES TO THE ANALYSIS OF ULTRACENTRIFUGAL SEDIMENTATION-VELOCITY MOLECULAR WEIGHT DATA FOR DEOXYRIBONUCLEIC ACID
G. R. Shepherd, P. N. Dean, and B. J. Noland. Jun 63, 37p refs
Contract W7405-eng-36

Y-KB-1 OTS $1.60

Union Carbide Nuclear Co., Oak Ridge, Tenn.
EXCRETION OF URANIUM FROM MIXED EXPOSURES UNDER INDUSTRIAL CONDITIONS
L. M. Scott. 22 May 62, 16p refs
Contract W7405-eng-26

Radiobiology

BNL-5953 OTS $8.10

Brookhaven National Lab., Upton, N. Y.
DISPOSITION OF RADIATION PRODUCTS AND ENERGY TRANSFER IN RADIOBIOLOGICAL PROCESSES
L. G. Augenstine. 28 Mar 62, 84p refs
Contract AT(30-2)GEN-16

BNL-5976 OTS $4.60

Brookhaven National Lab., Upton, N. Y.
RADIOACTIVE ISOTOPES: METABOLIC, DIAGNOSTIC AND THERAPEUTIC USES
Lee E. Farr and O. D. Easterday. 23 Apr 62, 49p refs
Contract AT(30-2)GEN-16

BNL-766(T-287) OTS $0.75

Brookhaven National Lab., Upton, N. Y.
THE ROLE OF THE CELL NUCLEUS IN DETERMINING RADIOSENSITIVITY. Brookhaven Lecture series no. 17.
Arnold H. Sparrow. 16 May 62, 31p refs
Contract AT(30-2)GEN-16
T-287

HW-SA-2606 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
CELL CYCLE POPULATIONS AND MITOTIC INHIBITION FOLLOWING X-RADIATION
J. Van't Hof. 11 Jun 62, 11p refs
Contract AT(45-1)1350

HASL-120 OTS $4.60

Health and Safety Lab., Atomic Energy Commission, New York.
THE SIGNIFICANCE OF URINE URANIUM EXCRETION DATA
M. Lippmann, L. D. Y. Ong, and W. B. Harris.
15 Jun 62, 46p refs

UCRL-1922 OTS $8.10

Lawrence Radiation Lab., Univ. of California, Berkeley.
MEDICAL AND HEALTH PHYSICS. Quarterly rept. Apr-Jun 52.
21 Aug 52, 86p refs
Contract W7405-eng-48

UR-610 OTS $4.50

Rochester Univ. School of Medicine and Dentistry, N. Y.
THE ENDOCRINE RESPONSE TO IONIZING RADIATION. A selective bibliography.
Frank M. Ganis, Thomas D. Brown, Carl L. Hansen, Jr., and Joe W. Howland, comp. 10 Oct 63, 366p refs
Contract W7401-eng-49

CHEMISTRY

TID-15773 OTS $2.60

Argonne National Lab., Ill.
COMPARATIVE EXTRACTION OF U(VI) BY NEUTRAL AND MONO-ACIDIC PHOSPHATES AND PHOSPHONATES
D. F. Peppard, G. W. Mason, I. Hucher, and F. A. J. A. Brandao. Feb 62, 21p refs
Contract W31-109-eng-38
UAC-6191

TID-15856 OTS $1.10

Argonne National Lab., Ill.
PARAMAGNETIC RESONANCE OF HYDRAZYL-TYPE RADICALS IN VISCOUS MEDIA
K. V. Sane and J. A. Weil. Mar 62, 10p refs
Contract W31-109-eng-38
UAC-6301

NAA-SR-8879 OTS $0.50

Atomics International, Canoga Park, Calif.
CALCULATION OF HEATS OF VAPORIZATION AND FUSION OF NONIONIC LIQUIDS FROM THE RIGID SPHERE EQUATION OF STATE
S. J. Yosim and B. B. Owens. 31 Oct 63, 13p refs
Contract AT(11-1)GEN-8

NAA-SR-8833 OTS $0.50

Atomics International, Canoga Park, Calif.
ELECTRODELESS DETERMINATION OF ELECTRICAL CONDUCTIVITIES OF MELTS AT ELEVATED TEMPERATURES
S. J. Yosim, L. F. Grantham, E. B. Luchsinger, and R. Wike. 31 Oct 63, 11p refs
Contract AT(11-1)GEN-8

NAA-SR-5200 OTS $0.50

Atomics International, Canoga Park, Calif.
THERMOPHYSICAL PROPERTIES OF IRRADIATED POLYPHENYL COOLANTS. PART II. ENTHALPY AND SPECIFIC HEAT
G. Asanovich, R. H. J. Gercke, and R. S. Moore. 30 Sep 63, 28p refs
Contract AT(11-1)GEN-8

GAT-T-971 OTS $1.10

Goodyear Atomic Corp., Portsmouth, Ohio.
HEXAFLUORIDES OF MOLYBDENUM, TUNGSTEN AND URANIUM. III. REACTIONS WITH NITROGEN DIOXIDE AND NITROGEN OXYHALIDES
J. R. Geichman, L. R. Swaney, and P. R. Ogle. 20 Feb 62, 9p refs
Contract AT(33-2)1

UCRL-10189 OTS $2.60

Lawrence Radiation Lab., Univ. of California, Berkeley.
CALCULATION OF INTEGRAL AND PARTIAL THERMODYNAMIC FUNCTIONS FOR SOLIDS FROM DISSOCIATION PRESSURE DATA
David J. Meschi and Alan W. Searcy. 23 Apr 62, 23p refs
Contract W7405-eng-48

UCRL-10848 OTS $3.00

Lawrence Radiation Lab., Univ. of California, Berkeley.
CHEMICAL REACTIONS IN CROSSED MOLECULAR BEAMS
James Arnold Norris. 27 Jun 63, 90p refs
Contract W7405-eng-48

UCRL-10063 OTS $3.60

Lawrence Radiation Lab., Univ. of California, Berkeley.
THE EXTRACTION OF ACIDS BY BASIC ORGANIC SOLVENTS. I. TRIBUTYL PHOSPHATE-$HClO_4$ AND TRIBUTYL PHOSPHATE-$HReO_4$
David C. Whitney and Richard M. Diamond. Apr 62, 33p refs
Contract W7405-eng-48

UCRL-10886 OTS $2.00

Lawrence Radiation Lab., Univ. of California, Berkeley.
VAPOR-LIQUID EQUILIBRIA FOR AQUEOUS SULFURIC ACID
John Irving Gmitro and Theodore Vermeulen. 24 Jun 63, 85p refs
Contract W7405-eng-48

TID-15934 OTS $1.60

Pittsburgh Univ., Pa.
THE MAGNETIC CHARACTERISTICS OF GADOLINIUM, TERBIUM AND YTTERBIUM HYDRIDES IN RELATION TO THE ELECTRONIC NATURE OF THE LANTHANIDE HYDRIDES
W. E. Wallace, Y. Kubota, and R. L. Zanowick. 12 Jan 62, 18p refs
Contract AT(30-1)647

DP-840 OTS $0.50

Savannah River Lab., Aiken, S. C.
AUTOMATIC COLORIMETRIC DETERMINATION OF URANIUM AND NEPTUNIUM
Robert D. Britt, Jr. Jul 63, 12p refs
Contract AT(07-2)1

N63-21050 OTS $12.50

Southern Research Inst., Birmingham, Ala.
A STUDY OF POLYMERS CONTAINING SILICON-NITROGEN BONDS. Annual summary rept., 4 Feb 52-3 Apr 63
Robert E. Burks, Jr. and Thomas W. Ray. 29 Apr 63 172p refs
Contract NAS8-1510
Report no. 5871-1259-XXVI; NASA CR-50954

Organic Chemistry

AD-290 433 OTS $1.10

Northwestern Univ. [Evanston, Ill.].
THE FORMATION, STRUCTURE, AND REACTIONS OF SULTONES. Final technical rept., Jun 59-Jun 62
F. G. Bordwell, J. R. Schaeffer, J. Biranowski, W. T. Brannen, Jr., and E. G. Nash. [1962] 3p
Grant DA-ARO(D)-31-124-G19
AROD no. 2267:2

DESCRIPTORS: *Sultones, Synthesis (Chemistry), Molecular structure, Chemical reactions, Alkoxides, Iodides, Hydroxides, Phenyl radicals, Butenes, Nitration,

Contents:
Synthesis of sultones
Structures of sultones
Reactions of sultones with ethoxide ion
Reaction of sultones with iodide ion
Nitration of cis and trans-2-phenyl-2-butenes with acetyl nitrate
Reaction of α-halosulfones with hydroxide ion

AD-290 421 OTS $1.10

Vanderbilt Univ., Nashville, Tenn.
INVESTIGATION OF DISULFIDES, SULFONES AND OTHER ORGANIC SULFUR COMPOUNDS. Status rept. no. 15 (Final technical rept.), 16 Sep 61-15 Jun 62
Lamar Field. [1962] 8p refs
Contract DA33-008-ORD-1637
AROD no. 2019:13

DESCRIPTORS: *Sulfur compounds, Organic compounds, *Sulfones, *Grignard reagents, *Sulfides, *Thiols, Synthesis (Chemistry), Chemical reactions,

Brief summaries are given of the reports issued under this contract. Also, a hitherto unpublished report on the Grignard reagents of sulfones is given.

Physical Chemistry

IS-458 OTS $1.60

Ames Lab., Iowa State Univ. of Science and Tech.
FORMATION CONSTANTS OF THE COMPLEX SPECIES FORMED BY INTERACTION OF RARE-EARTH NITRILOTRIACETATE COMPLEXES WITH AN EQUIVALENT AMOUNT OF BASE
Asim K. Gupta and Jack E. Powell. 10 May 62, 11p refs
Contract W7405-eng-82

IS-595 OTS $2.25

Ames Lab., Iowa State Univ. of Science and Tech.
METAL NITRATE COMPLEXES WITH TRIBUTYL PHOSPHATE AND WITH TRIOCTYL PHOSPHINE OXIDE
Eugene Warren Nadig and Morton Smutz. Feb 63, 115p refs
Contract W7405-eng-82

IS-481 OTS $1.60

Ames Lab., Iowa State Univ. of Science and Tech.
SOLUTIONS OF GALLIUM(I) SALTS IN AQUEOUS BASE
John D. Corbett. 16 Jul 62, 12p refs
Contract W7405-eng-82

IS-618 OTS $1.50

Ames Lab., Iowa State Univ. of Science and Tech.
A STUDY OF THE NITRATE ION DISSOCIATION IN FUSED NITRATES
Roger Nayland Kust and F. R. Duke. Feb 63, 61p refs
Contract W7405-eng-82

IS-443 OTS $1.60

Ames Lab., Iowa State Univ. of Science and Tech.
TRANSFERENCE NUMBERS AND ION ASSOCIATION IN PURE FUSED ALKALINE EARTH CHLORIDES
Edward D. Wolf and Frederick R. Duke. 30 Apr 62, 12p refs
Contract W7405-eng-82

BNL-6174 OTS $2.60

Brookhaven National Lab., Upton, N. Y.
THE SECONDARY α-DEUTERIUM ISOTOPES EFFECT IN THE THERMAL DECOMPOSITION OF α-PHENYLETHYLAZO-2-PROPANE[1, 2]
Stanley Seltzer. 19 Jun 62, 24p refs
Contract AT(30-2)GEN-16

BNL-6188 OTS $1.10

Brookhaven National Lab., Upton, N. Y.
ON THE SYNERGISTIC EFFECT IN SOLVENT EXTRACTION
Leonard Newman. Jun 62, 8p refs
Contract AT(30-2)GEN-16

HW-SA-2621 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
THE IMMISCIBILITY GAP IN THE SYSTEM: $LiCl-KCl-AlCl_3$
R. H. Moore. 5 Jul 62, 15p refs
Contract AT(45-1)1350

HW-SA-2595 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
pH CONTROL BY ION EXCHANGE IN HIGH pH SYSTEMS
Thomas F. Demmitt. 7 May 62, 14p refs
Contract AT(45-1)1350

LA-2686 OTS $11.50

Los Alamos Scientific Lab., N. Mex.
THE KINETICS OF THE EXCHANGE OF CHLORINE ATOMS BETWEEN HYDROGEN CHLORIDE AND BENZYL CHLORIDES SOLVENT EFFECTS
Warren Bruce. Mar 62, 157p refs
Contract W7405-eng-36

AD-400 691 OTS $2.60

Stanford Research Inst., Menlo Park, Calif.
RATES OF CHARGE PRODUCTION IN THE NITROGEN AFTERGLOW. Rept. on Project Squid
C. R. Gatz, F. T. Smith, and H. Wise. Mar 63, 23p refs
Contract Nonr-3623(00)
Technical rept. SRI-16-P; N63-14565

DESCRIPTORS: *Nitrogen, *Gas ionization, Nitrogen compounds, Oxides, Reaction kinetics, *Ionic currents,

Charge-production rates in the nitrogen afterglow were obtained from saturation-current measurements. The results for various values of total pressure, initial nitrogen atom concentration, and rate of addition of NO show that the ionization may be the result of one or more of the following reactions:

$$N_2^* + N + O \rightarrow N_2 + NO^+ + e$$

$$N_2^* + NO^* \rightarrow N_2 + NO^+ + e$$

$$N + N + NO^* \rightarrow N_2 + NO^+ + e$$

where N_2^* is a long-lived and NO^* a short-lived metastable state. (Author)

EARTH SCIENCES

AD-297 261 OTS $15.50

[Naval Oceanographic] Office, Washington, D. C.
OPERATION DEEP FREEZE 61, 1960-1961. MARINE GEOPHYSICAL INVESTIGATIONS
Jun 62, 234p refs
Technical rept. TR-105

DESCRIPTORS: *Antarctic regions, *Marine geophysics, Marine geology, *Oceanology, Data, Temperature, Salinity, Bathythermographs, Tables, Measurement, Instrumentation, Ice, Terrestrial magnetism,

Contains results of the Marine Geophysical Investigations in the Antarctic and adjacent waters. Data on the thermal structure, salinity, density, dissolved oxygen, field analysis of bottom sediment, ice distribution, bathymetry across the South Sandwich Trench, and geomagnetic measurements are presented. A discussion of the Antarctic Convergence is also included. Appendix A contains a tabulation of oceanographic data for 94 stations and Appendix B, the field analysis of 71 bottom sediment samples. (Author)

Climatology and Meteorology

N63-21272 OTS $0.50

Georgia Inst. of Tech., Atlanta.
IONOSPHERIC WINDS: MOTIONS INTO NIGHT AND SPORADIC E CORRELATIONS
N. W. Rosenberg, H. D. Edwards, and J. W. Wright. Sep 63, 19p refs
Grant NsG-304-63
Technical note D-2114

Presented at the COSPAR Meeting, Warsaw, Jun 63.

PB-163 824 OTS $9.10

Institute of Polar Studies, Ohio State U. Research Foundation, Columbus.
SOUTH POLE MICROMETEOROLOGY PROGRAM, PART II: DATA ANALYSIS. Rept. for 1957-1958
Paul C. Dalrymple, Heinz H. Lettau, and Sarah H. Wollaston. Jun 63, 108p refs
Grant NSF-G19603
Rept. no. 20; QREC Technical rept. ES-7

DESCRIPTORS: *Micrometeorology, *Antarctic regions, Meteorology, Atmospheric motion, Atmospheric temperature, Surface temperature, Temperature inversion, Lapse rate, *Meteorological data, Analysis, Glaciers, Energy,

At the South Pole, in 1958, observations were recorded of wind and temperature profiles in the lowest 8 m of the atmosphere and temperature profiles in the upper 8 m of the snow. Hourly means of these observations for several thousand hours have been published in Part I of this program, "Data Presentation." The current volume deals with the analysis of the data and is directed toward determining the energy exchanges at the snow-air interface.

PB-163 823 OTS $8.10

Lowell Technological Inst. Research Foundation, Mass.
IONOSPHERIC RESEARCH USING ARTIFICIAL EARTH SATELLITES. Final rept.
Gary S. Sales and Carlisle L. Dieter. Mar 61, 85p refs
Contract AF19(604)4156
AFCRL-TR-61-894

DESCRIPTORS: *Atmospheric sounding, *Ionosphere, *Scientific satellites, *Satellites (Artificial), Doppler effect, Magneto-optic effect, Telemeter systems, Electronic equipment, *Data processing systems, Design.

A complete receiving and data handling system was designed for using the radio signals from artificial earth satellites. An experimental program is outlined for the study of the regular and irregular properties of the ionosphere: i.e., using the Doppler shift effects and Faraday Rotation effects of the ionosphere on radio signals from satellites to determine electron content below the satellite. A spaced antenna experiment has been developed for studying the properties of the irregularities in the ionosphere. (Author)

AD-402 705 OTS $2.60

Washington Univ. Seattle.
OROGRAPHIC DEFORMATION OF WIND FLOW. Quarterly progress rept. no. 2, 15 Oct 62-15 Jan 63
K. J. K. Buettner, J. Zimmerman, and G. Maykut. [1963] 23p refs
Contract DA36-039-sc-89118

DESCRIPTORS: *Wind, *Mountains, Radioactive fallout, Meteorology, Radiosondes, Diffusion, Computers, Programming (Computers), Analysis, Terrain,

A combined microscopic and scintillation analysis is at the present time being made of the data taken during the summer months. During the winter, emphasis is being placed first upon the derivation of a generalized flow pattern over the Cascade Mountains in Washington and secondly a numerical program to approximate fallout on a somewhat smaller scale. (Author)

ENGINEERING

PB 181 570 OTS $0.50

Bureau of Ships, Washington, D. C.
BUREAU OF SHIPS SHOP PRACTICE SUGGESTIONS [NO. 8] Nov 63, 19p

DESCRIPTORS: *Ships, Maintenance, *Machine shop practice, Sonar equipment, Welding, Valves, Guided missiles, Boilers, Thermal insulation, Hose fittings, Wire, Anchors (Marine), Turbine parts, Hoists, Ship auxiliary equipment, Reciprocating pumps, Cables (Mechanical), Arresting gear, Electric cables, Periscopes, Film readers, Monitors, Batteries and components, Fuel tanks, Searchlights

Contents: sonar polar recorder; adjustable pipe welding jig; electromagnetic log sea valve; aluminum ladders; gas adapter for aluminum stud welding; access plates in cold storage space insulation; air hose fitting and clamp; automatic wire tinning attachment; anchor chain guide; Datarite chemical dispenser gage; steam turbine nozzle plate; lifting gear shackle pins; elimination of the speed converter; reciprocating pump liners; jacking jig for deck grids; cable stuffing tube packing disks; door switch; reeving arresting gear engines through deck; temporary waterway strips; testing main condenser sea valves; yellow electrical cables; keeping periscopes clean; microfilm enlarger; joint covers; test adapter for plug-in cables; installing the bridge monitor; battery well service flats; preventing fuel tank contamination; microfilm viewer; turbine alining bar; automatic drain traps; temporary cable hook; periscope hoisting rods; preventive searchlight maintenance. (See also PB 181 500)

GAT-T-927 OTS $1.10

Goodyear Atomic Corp., Portsmouth, Ohio.
GRANULAR MATERIAL SAMPLER
C. L. Truman, C. C. Bolt, and W. R. Green.
25 Sep 61, 5p
Contract AT(33-2)1

N63-22897 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AN ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF THE NATURAL FREQUENCIES OF UNIFORM RECTANGULAR-CROSS-SECTION FREE-FREE SANDWICH BEAMS
Robert R. Clary and Sumner A. Leadbetter. Oct 63, 20p refs
Technical note D-1967

UCRL-10953 OTS $0.50

Lawrence Radiation Lab., Univ. of California, Berkeley.
DRY SCRUBBER UNIT FOR LOW-LEAK VENTILATION SYSTEMS
Jensen Young, Wayne T. Pearce, and Thomas C. Parsons. 7 Aug 63, 14p refs
Contract W7405-eng-48

N63-21912 OTS $1.50

National Aeronautics and Space Administration, Washington, D. C.
RELIABILITY PROGRAM EVALUATION PROCEDURES. Sep 63, 52p
NASA SP-6002

SCDR-221-63 OTS $0.50

Sandia Corp., Albuquerque, N. Mex.
EVALUATION OF A CURTAINED LAMINAR DOWN-FLOW CLEAN ROOM (U)
W. J. Whitfield, W. E. Neitzel, J. C. Mashburn, and R. C. March. Aug 63, 15p
Contract AT(29-1)789

SCR-99B(Rev. 2) OTS $0.50

Sandia Corp., Albuquerque, N. Mex.
SANDIA CORPORATION PAPERS ON RELIABILITY AND RELATED TOPICS BY RELIABILITY DEPARTMENT. Bibliography.
Jun 59, rev. Sep 63. 12p refs
Contract AT(29-1)789

Aeronautical Engineering

N63-20890 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A SIMULATOR STUDY OF AIRSPACE REQUIREMENTS FOR THE SUPERSONIC TRANSPORT
Richard H. Sawyer. Sep 63, 23p
Technical note D-1964

N63-22168 OTS $1.10

National Aeronautics and Space Administration, Washington, D. C.
THE SHAPE OF THINGS TO COME
Albert J. Evans. [1962] 9p
Report no. X-50302

Presented at the International Air Transport Association's Public Relations Conference, Washington, 13 Nov 62.

Chemical Engineering

TID-15792 OTS $4.60

Argonne National Lab., Ill.
COUNTERCURRENT MUTUAL SEPARATION OF Y^{91} AND Pm^{147} BY SOLVENT EXTRACTION USING PULSE COLUMN
M. A. Mandil, G. W. Mason, and D. F. Peppard.
Feb 62, 47p refs
Contract W31-109-eng-38
UAC-6155

NAA-SR-8388 OTS $0.75

Atomics International, Canoga Park, Calif.
REPROCESSING OF URANIUM CARBIDE BY A NITRIDE: CARBIDE CYCLE. I. KINETICS OF NITRIDE FORMATION
L. A. Hanson. 31 Oct 63, 37p refs
Contract AT(11-1)GEN-8

Electrical and Electronic Engineering

N63-22861 OTS $1.25

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
A METHOD FOR ANALYZING NONLINEAR CLOSED-LOOP CONTROL SYSTEMS WITH STATIONARY STOCHASTIC INPUTS
Wilfred J. Minkus. Oct 63, 48p refs
Technical note D-2061

IS-665 OTS $0.50

Ames Lab., Iowa State Univ. of Science and Tech.
STUDY OF A GRAPHITE-OXYGEN HIGH-TEMPERATURE FUEL CELL
Frederick R. Duke and James L. Copeland. Aug 63, 11p
Contract W7405-eng-82

N63-13028 OTS $4.60

General Electric Co., Philadelphia, Pa.
DEVELOPMENT OF LOW TEMPERATURE DIELECTRIC COATINGS FOR ELECTRICAL CONDUCTORS. Quarterly rept. no. 4
K. N. Mathes. 16 July 62, 44p refs
Contract NAS8-2442

AD-401 907 OTS $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
MILLSTONE HILL ZENITH-POINTING PARABOLOID
Mark E. Devane. 7 Jan 63, 20p refs
Contract AF19(628)500
Rept. no. 315G-4

DESCRIPTORS: *Parabolic antennas, *Antenna radiation patterns, Models (Simulation), Antenna lobes, Gain, Ultrahigh frequency, Transmitter-receivers, Antenna feeds, Radio astronomy, Measurements,

A scale model of the Millstone Hill Zenith Dish was constructed and radiation patterns and gain measured. The measured performance is in close agreement with the predicted. The efficiency of the full-scale antenna was measured using Cygnus A as a source and found to be the same as that of the model 47%. (Author)

AD-401 752 OTS $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN OPTIMUM DEMODULATOR FOR POISSON PROCESSES: PHOTON SOURCE DETECTORS
B. Reiffen and H. Sherman. 20 Feb 63, 18p refs
Contract NAS9-105
Rept. no. 25G-16; AP-25

DESCRIPTORS: *Photons, *Detectors, Statistical processes, *Radar signals, Radar pulses, Sources, Signal-to-noise ratio, Lasers, Optical filters, Background, Correlation techniques, Data processing systems,

The optimum demodulator for time-varying Poisson processes is derived from consideration of the likelihood ratio. In the case of high background level radiation, it has been found that the optimum signal processing is cross-correlation. Under an average energy constraint and conditions of high background radiation, an optimum binary signaling method is "on-off" modulation. For both binary signaling and radar purposes, the "on" waveform should be a narrow pulse in order to maximize the "signal-to-noise" ratio. (Author)

N63-22894 OTS $5.60

Marquardt Corp., Van Nuys, Calif.
BIOCHEMICAL FUEL CELLS. Quarterly progress rept. no. 1, 22 Mar-31 Jul 63
George E. Ellis and Edward E. Sweeney. 10 Aug 63, 59p refs
Contract NASw-654
Report no. 25093; NASA CR-51565

AD-281 556 OTS $1.60

Merck Sharp and Dohme Research Labs., Rahway, N. J.
STRUCTURAL INVESTIGATIONS IN THERMOELECTRIC MATERIALS. Progress rept. no. 5, 1 Feb-31 Mar 61
P. I. Pollak, J. B. Conn, R. C. Taylor, E. J. Sheehan, and J. J. Kirby. [1961] 19p
Contract NObs-78503

DESCRIPTORS: *Thermoelectricity, Materials, Metalloid alloys, *Bismuth alloys, *Antimony alloys, *Selenium alloys, *Tellurium alloys, *Arsenic alloys, Mercury alloys, Cadmium alloys, Chalcogenides, *Indium alloys, Impurities, Thermal conductivity, Electrical properties.

This report describes a reexamination of the system (BiSbTeSe), discusses some attempts to dope $AsBiTe_3$, and describes the investigation of alloys of the chalcogenides of bismuth or antimony with mercury or cadmium chalcogenides. In addition, the attempted synthesis of In_4SbTe_3 is also described. (See also AD-294 668)

AD-281 555 OTS $1.60

Merck Sharp and Dohme Research Labs., Rahway, N. J.
STRUCTURAL INVESTIGATIONS IN THERMOELECTRIC MATERIALS. Summary rept., 1 Jun 60-31 May 61
P. I. Pollak, J. B. Conn, R. C. Taylor, E. J. Sheehan, and J. J. Kirby. [1961] 13p refs
Contract NObs-78503

DESCRIPTORS: *Thermoelectricity, Materials, Metalloid alloys, *Bismuth alloys, *Antimony alloys, *Selenium alloys, *Tellurium alloys, Arsenic alloys, Cadmium alloys, Mercury alloys, Chalcogenides, Electrical properties,

The principal research effort has been devoted to an intensive study of the alloy system bismuth-antimony-selenium-tellurium, in order to identify the composition having most useful thermoelectric properties. The majority of time was given to systems based on $Bi_2Te_3 \cdot 3Sb_2Te_3$, with brief surveys of the less interesting $Bi_2Te_3 \cdot 2Sb_2Te_3$ and $Bi_2Te_3 \cdot 7Sb_2Te_3$. Surveys have also been made on the n-type alloys $Bi_2Se_2Te_{3-x}$ and $AsBiTe_3$, and upon cadmium and mercury chalcogenide alloys with those of arsenic, antimony, and bismuth. Techniques have also been worked out for the evaluation of thermoelectric parameters. Within the period, over 350 ingots have been processed through the evaluation stage. (Author)

AD-280 653 OTS $1.60

Titanium Alloy Mfg. Div., National Lead Co., Niagara Falls, N. Y.
THERMOELECTRIC MATERIALS. Bimonthly progress rept. no 9, 1 May-30 Jun 61
Merton H. Brooks. 15 Jul 61, 12p
Contract NObs-78326

DESCRIPTORS: *Thermoelectricity, *Ceramic materials, Oxides, Lithium compounds, Titanium compounds, Preparation, Material forming, Electrical properties, Test methods,

This report covers syntheses and processing of certain ceramic materials; calculation of formulations of many additional compositions have also been made. Approximately 50 compositions have been screened by electrical tests. (Author) (See also PB-160 851)

Ordnance, Missiles, and Satellite Vehicles

N63-20962 OTS $16.00

Aeronutronic, Newport Beach, Calif.
LUNAR ROUGH LANDING CAPSULE DEVELOPMENT PROGRAM. Final technical rept.
20 Feb 63, 249p refs
Contract NAS7-100
Publication no. U-2007; NASA-CR-51022

N63-22711 OTS $0.75

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
FLIGHT SHOCK AND VIBRATION DATA OF THE ECHO A-12 APPLICATION VERTICAL TESTS (AVT-1 AND AVT-2)
W. B. Tereniak and S. A. Clevenson. Oct 63, 26p refs
Technical note D-1908

N63-21337 OTS $31.00

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EARTH-VENUS TRAJECTORIES, 1967, VOLUME 3, PART A
V. C. Clarke, Jr., R. Y. Roth, W. E. Bollman, T. W. Hamilton, and C. G. Pfeiffer. 15 June 63, 790p refs
Contract NAS7-100
Technical memo no. 33-99, v. 3, pt. A;
NASA CR-50991

N63-21338 OTS $31.00

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EARTH-VENUS TRAJECTORIES, 1967, VOLUME 3, PART B
V. C. Clarke, Jr., R. Y. Roth, W. E. Bollman, T. W. Hamilton, and C. G. Pfeiffer. 1 Jul 63, 789p refs
Contract NAS7-100
Technical memo no. 33-99, v. 3, pt. B;
NASA CR-51010

N63-21339 OTS $31.00

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EARTH-VENUS TRAJECTORIES, 1967, VOLUME 3, PART C
V. C. Clarke., Jr., R. Y. Roth, W. E. Bollman, T. W. Hamilton, and C. G. Pfeiffer. 15 Jul 63, 792p refs
Contract NAS7-100
Technical memo no. 33-99, v. 3, pt. C;
NASA CR-51329

N63-21348 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE ELECTRIC SPACE CRUISER FOR HIGH-ENERGY MISSIONS
Robert J. Beale, Evelyn W. Speiser, and James R. Womack. 8 Jun 63, 21p refs
Contract NAS7-100
Technical rept. no. 32-404; NASA CR-51015

N63-21328 OTS $5.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MOON-TO-EARTH TRAJECTORIES
S. S. Dallas. 1 Jun 63, 52p refs
Contract NAS7-100
Technical rept. no. 32-412; NASA CR-50957

N63-22581 OTS $17.00

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-22, VOLUME IV, FOR THE PERIOD JUNE 1, 1963 TO JULY 31, 1963. SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT
31 Aug 63, 270p refs
Contract NAS7-100
NASA-CR-51783

N63-21892 OTS $3.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
SURFACE PRESSURE DISTRIBUTIONS ON 0.0628-SCALE MODELS OF PROPOSED PROJECT FIRE SPACE VEHICLES AT MACH NUMBERS FROM 0.25 TO 4.63
Albin O. Pearson. Sep 63, 166p
Technical note D-1961

AD-401 488 OTS $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
DETERMINATION OF WEIGHT-TO-DRAG RATIO FROM RADAR MEASUREMENTS
S. F. Catalano and H. Schneider. 8 Mar 63, 19p refs
Contract AF19(628)500; ARPA Order 56
Rept. no. 47G-6

DESCRIPTORS: *Re-entry vehicles, *Atmosphere entry, Drag, Weight, *Radar tracking, Gravity, Earth, Rotation, Equations, Mathematical analysis, Measurement.

This paper includes two methods for the determination of weight-to-drag ratio, β, from radar measurements. Both methods include the effects of gravity and the rotation of the earth and its atmosphere.

AD-402 841 OTS $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A DISCUSSION OF THE USE OF A SYSTEM OF PASSIVE SATELLITES IN STATIONARY ORBITS FOR RADIO COMMUNICATION
Robert N. Assaly. 28 Feb 63, 30p
Contract AF19(628)500
Rept. no. 315G-5

DESCRIPTORS: *Communication satellites (Passive), *Satellites (Artificial), Reflectors, Balloons, Radar echo areas, Radio signals, Electromagnetic wave reflections, Synchronous satellites, Mathematical analysis, Operation, Design.

The general aspects of a satellite communication system, where the satellites are passive reflectors located in stationary orbit, are discussed. Several reflector shapes are considered where each reflector is a thin-walled, metal-coated balloon. Their weights are compared for the same radar cross section. In addition, the coverage of the satellite system is determined where each satellite is designed so that it scatters the energy within a limited angular range. (Author)

AD-283 416 OTS $4.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
OPTICAL OBSERVATIONS OF LINCOLN LABORATORY HYPERSONIC RE-ENTRY VEHICLES TRAILBLAZER Ic AND Id
Florence A. Wilson and John R. Bauer. 16 May 62, 45p refs
Contract AF19(604)7400; ARPA Order 13
Rept. no. 312G-7; AFESD-TDR-62-117; N63-15074

DESCRIPTORS: *Re-entry vehicles, *Hypersonic test vehicles, Optical tracking, Atmosphere entry, Photographic analysis, Booster rockets, Mathematical analysis, Thermal radiation, Photography.

Two Trailblazer I vehicles were fired from Wallops Island, Virginia, within approximately a three hour period during the night of 28-29 August 1960. The first vehicle, Trailblazer Ic, was photographed from Arbuckle Neck, Virginia and from Coquina Beach, North Carolina between the heights of 152 kft (10^3 feet) and 119 kft. The re-entry velocity, computed from a Super-Schmidt photograph taken at Arbuckle Neck, was about 19 kft/sec. The other vehicle, Trailblazer Id, was photographed at Wallops Island and Arbuckle Neck; due to a very short baseline between the latter two stations, the trajectory information obtained is not too reliable. The Id photographs show two trails, probably due to separation of the ablating coating from the sphere.

AD-296 540 OTS $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
PROGRAMS FOR CALCULATING A PREDICTED RADAR TRAJECTORY
K. Kresa and M. Tausner. 8 Aug 62, 40p refs
Contract AF19(604)7400; ARPA Order 13
Rept. no. 312G-13

DESCRIPTORS: *Guided missile trajectories, *Equations of motion, *Programming (Computers), Digital computers, Radar tracking, Guided missile tracking systems, Data processing systems, Azimuth, Ranges (Distance), Mathematical analysis, Guided missiles.

This report describes a pair of programs which has been written for the IBM 7090 high speed digital computer to provide trajectory parameters of a multi-stage missile in terms of sensor coordinates. These complement a program entitled "Three-degrees-of-freedom Trajectory Analysis Program". The programs described herein process the data provided by the above to transform the trajectory to sensor coordinate systems for any number of sensors, each of which may be located at any longitude and latitude and at any height above the surface of a non-rotating earth. Included in the output of these programs are the range, azimuth, and elevation plus their first and second derivatives and the aspect angle for the primary missile. In addition these programs provide the range rate for each burned out stage and the incremental range, azimuth, and elevation between the primary missile and each burned out stage.

N63-21101 OTS $5.00

Martin Co., Baltimore, Md.
SPACE FLIGHT HANDBOOKS. VOLUME I: ORBITAL FLIGHT HANDBOOK: PART I - BASIC TECHNIQUES AND DATA
George Townsend and Donald Kraft. 1963, 323p. refs
Contract NAS8-5031
Report no. SP-33, pt. 1

AD-273 782 OTS $4.60

Naval Weapons Lab., Dahlgren, Va.
FIELD EVALUATION OF THE ROCKET BASE FUZE MK 191 MOD 1. Final rept.
D. M. Potter. 20 Mar 62, 42p refs
NWL rept. no. 1797

DESCRIPTORS: *Rocket fuzes, *Electric fuzes, Safety, Operation, Tests

Safety and operability of the Rocket Base Fuze Mk 191 Mod 1 were investigated in a field evaluation program. Fuze functioning did not occur in impact safety tests. In the operability tests a 100% fuze functioning performance was obtained at 1800-2000 ft/sec against a variety of targets at obliquities of 0° to 60°. From the results of tests conducted, it is concluded that at a distance of 400 feet from the point of launching the Mk 191 Mod 1 Fuze is not armed and is impact safe. It is further concluded that the Mk 191 Mod 1 Fuze is operable against both light and heavy targets and functions with a delay after target impact. (Author)

PB-163 871 OTS $7.60

Pacific Missile Range, Point Mugu, Calif.
PMR FIELD STUDY (NO. 7). TARAWA ATOLL, GILBERT AND ELLICE ISLANDS COLONY
Edwin Doran, Jr. 1 Feb 60, 79p refs
Technical memo. no. PMR-TM-59-15

DESCRIPTORS: *Guided missile ranges, *Site selection, *Pacific Islands, Geography, Military facilities, Test facilities, Ranges (Establishments).

Contents:
Physical description
Ownership and political stability
Population and cultural attitudes
Land use and ownership
Facilities available
Selected bibliography

PB-171 603-V-2 OTS $8.00

Picatinny Arsenal, Dover, N. J.
ENCYCLOPEDIA OF EXPLOSIVES AND RELATED ITEMS. VOLUME 2: B TO CHLORIC ACID
Basil T. Fedoroff, Oliver E. Sheffield, Earl F. Reese, and George D. Clift. 1962, 643p refs
Rept. no. PATR 2700, volume 2

DESCRIPTORS: *Explosives, *Encyclopedias.

Contents:
Errata in vol 1
Abbreviations, code names, and symbols
Abbreviations for books and periodicals
Descriptive text of encyclopedic items
B(Explosif) to BWC
C(Explosifs) to chloric acid
(See also AD-257 189)

SC-4792(RR) OTS $0.50

Sandia Corp., Albuquerque, N. Mex.
INVESTIGATION OF COMPONENT AND PROCESS VARIATION FOR TUNGSTEN DELAY COMPOSITIONS
R. E. McIntyre (Harry Diamond Labs.) Sep 63, 11p refs
Contract AT(29-1)789

FOOD, HANDLING, AND PACKAGING EQUIPMENT

PB-163 822 OTS $2.60

Economic Research Service, Dept. of Agriculture, Washington, D. C.
FREEZE-DRIED FOODS AND THE FROZEN FOOD INDUSTRY
Kermit Bird. Oct 63, 25p refs

Also obtainable free from the Division of Information, Office of Management Services, U.S. Department of Agriculture, Washington, D. C. 20025, as long as copies are available.

DESCRIPTORS: *Frozen foods, *Freeze drying, Preservation, Taste,

Discusses advantages, disadvantages, and major markets of freeze-drying, quality of freeze-dried foods, cost of freeze-drying, expected volumes, and relation of freeze-drying and the frozen food industry.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

Engines and Propulsion Systems

NAA-SR-8303 OTS $1.75

Atomics International, Canoga Park, Calif.
AEROSPACE SAFETY REENTRY ANALYTICAL AND EXPERIMENTAL PROGRAM SNAP 2 AND 10A. Interim rept.
R. D. Elliott. 30 Sep 63, 69p refs
Contract AT(11-1)GEN-8

N63-21043 OTS $9.10

Marquardt Corp., Van Nuys, Calif.
THRUST CHAMBER COOLING TECHNIQUES FOR SPACECRAFT ENGINES. VOLUME I: EVALUATION PROCEDURE AND ANALYSIS
D. R. Batha, M. D. Carey, J. G. Campbell, and C. D. Coulbert. 15 Jul 63, 102p refs
Contract NAS7-103
Report no. 5981, v. 1; NASA CR-50958

Manufacturing Equipment and Processes

AD-416 451 OTS $5.00

Chance Vought Corp., Dallas, Tex.
SHEET METAL FORMING TECHNOLOGY (HANDBOOK), VOLUME II. Final rept., 1 Oct 61-30 Apr 63
W. W. Wood, R. A. Ford, W. D. Moore, and C. W. McHugh. Jul 63, 342p refs
Contract AF33(657)7314
ASD-TDR-63-7-871

DESCRIPTORS: *Material forming, *Metals, *Alloys, *Sheets, Procurement, Costs, Heat treatment, Physical properties, Design, *Explosive forming, *Electroforming, Hot-working, Metal forming presses, Vibration, *Handbooks

Volume II is presented in three major sections: Material Purchasing Information, Conventional Forming, and Advanced Methods of Forming. The first gives availability, costs, chemical composition, heat treatment, and properties for a broad range of sheet metal alloys. Quantitative design limits are given in the Conventional Forming Section. The section on Advanced Methods of Forming presents the fundamentals for such forming processes as explosive, capacitor discharge, combustible gas, high pressure rubber, and vibration. (Author) (See also AD-416 412)

AD-416 412 OTS $5.00

Chance Vought Corp., Dallas, Tex.
SHEET METAL FORMING TECHNOLOGY, VOLUME I. Final rept., 1 Oct 61-30 Apr 63
W. W. Wood and others. Jul 63, 375p refs
Contract AF33(657)7314
ASD-TDR-63-7-871

DESCRIPTORS: *Material forming, *Metals, *Sheets, Test methods, Tensile properties, *Dies, *Explosive forming, *Electroforming, Metal forming presses, Hot-working.

The purpose of this project is to determine the inherent limitations of sheet metal forming processes, to develop the knowledge to significantly advance these, and to recommend the manner in which this can be accomplished. Volume I presents the experimental work on the program for tensile testing, free bulging of tubing and domes, and forming of parts with dies using a projectile impact tensile test fixture, low explosive - closed system, high explosive - open system, electrohydraulic - open system, electromagnetic system, and conventional presses. In addition, high pressure rubber forming was investigated utilizing both static and impact presses in conjunction with heat. Recommendations are made on the most promising sheet metal forming processes for the future based on material formability, process competitive factor, part shape applicability, tooling potential, and manufacturing potential. (Author) (See also AD-294 949)

PB-181 573 OTS $3.50

Little (Arthur D.) Inc., Cambridge, Mass.
PATTERNS AND PROBLEMS OF TECHNICAL INNOVATION IN AMERICAN INDUSTRY. Rept. to National Science Foundation
Sep 63, 211p
C-65344

DESCRIPTORS: *Industrial research, *Textile industry, *Machine tool industry, *Construction materials industry, *Electrical industry, *Semiconductors, Industrial production, Economics, Industries, Inventions,

Background information, technical innovations, patterns, and problems of innovation are given for the textile, semiconductor, machine tool, and building industries.

PB-181 572 OTS $1.00

Little (Arthur D.) Inc., Cambridge, Mass.
PROBLEMS OF INNOVATION IN AMERICAN INDUSTRY. Rept. to U. S. Dept. of Commerce
May 63, 39p
C-65275

DESCRIPTORS: *Industrial research, *Inventions, *Conferences, Industrial production, Economics, Industries,

Independent inventors and new small firms suffer from lack of financial, technical, marketing, and informational resources; large firms suffer from the need for new skills and new organizational models in order to use more effectively the very considerable resources they possess. A summary is given of a conference on problems and patterns of technical innovation attended by presidents of small companies, research and development directors of large firms, independent inventors, economists, patent attorneys and others with special interests and experience relevant to technical innovation.

MATERIALS

N63-22713 OTS $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
MINIMUM-OIL-FLOW REQUIREMENTS OF HIGH-SPEED BALL BEARINGS AT TEMPERATURES TO 800°F
Dean C. Glenn and William J. Anderson. Oct 63, 23p refs
Technical note D-1994

N63-20888 OTS $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
PRELIMINARY INVESTIGATION OF PARTICLE-SUBSTRATE BONDING OF PLASMA-SPRAYED MATERIALS
Salvatore J. Grisaffe and William A. Spitzig. Sep 63, 31p refs
Technical note D-1705

OTS-SB-515 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
PAPER
Jul 63, 34p refs
OTS Selective Bibliography SB-515

DESCRIPTORS: *Paper, Production, Physical properties, Test methods, Paper industry.

Lists 558 domestic and foreign references to reports added to the OTS collection through July 1963, arranged in three groups: Paper Production, covers research on paper making, i.e., chemical processing, waste, recovery, prevention of yellowing, rendering opaque, bleaching of Kraft pulp, and machinery. Paper Properties and Tests, covers research on specifications and measurement of paper with respect to tensil strength, aging, brightness, opacity, porosity, etc. Paper Products, covers information on many items, such as, filter papers, paper blanklets, paperboard honeycomb, sanitary and facial tissues, mapping paper, disposable paper clothing, insulating tape of water-proof paper, carbon and recording papers, etc. (Author)

Ceramics and Refractories

BMI-1647 OTS $0.50

Battelle Memorial Inst., Columbus, Ohio.
RESISTANCE OF CERAMIC FUEL-PARTICLE COATINGS TO REACTIONS WITH OXYGEN AND GRAPHITE
William H. Pfeifer, George W. Cunningham, Donald C. Carmichael, and Edwin S. Hodge. 6 Sep 63, 20p refs
Contract W7405-eng-92

PB-163 787 OTS $4.60

Fansteel Metallurgical Corp. [North Chicago, Ill.]
COATINGS ON GRAPHITE. Topical progress rept. Sep 48-Mar 50
Rept. no. NEPA-1402

DESCRIPTORS: *Graphite, Oxidation, *Coatings, *Refractory coatings, *Silicon, *Molybdenum compounds, Silicides, Vapor plating, Reactor moderators,

The purpose of this investigation was to develop a coating which would prevent the oxidation of graphite at elevated temperature in air. Oxidation resistance and thickness were selected as the criteria for evaluating coatings in this preliminary study because of their importance and the ease with which they could be measured.

HW-76302 OTS $2.25

Hanford Atomic Products Operation, Richland, Wash.
CERAMICS RESEARCH AND DEVELOPMENT OPERATION. Quarterly rept. Apr-Jun 63.
4 Nov 63, 100p refs
Contract AT(45-1)1350

DP-819 OTS $1.00

Savannah River Lab., Aiken, S. C.
EVALUATION OF FUSED UO_2
G. Rolland Cole. Apr 63, 39p refs
Contract AT(07-2)1

MATHEMATICS

IS-748 OTS $0.75

Ames Lab., Iowa State Univ. of Science and Tech.
METHOD FOR THE SOLUTION OF THE ALGEBRAIC EIGEN PROBLEM FOR THE IBM 7074 COMPUTER
William J. Higby. Sep 63, 27p refs
Contract W7405-eng-82

WAPD-T-1343 OTS $1.10

Bettis Atomic Power Lab., Pittsburgh, Pa.
AN EFFICIENT CONSTRUCTION OF ORTHONORMAL POLYNOMIALS
G. L. Strobel. Apr 61, 8p refs
Contract AT(11-1)GEN-14

N63-21047 OTS $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SEQUENTIAL ESTIMATION OF CORRELATED STOCHASTIC VARIABLES
C. G. Pfeiffer. 1 Jul 63, 14p refs
Contract NAS7-100
Technical rept. no. 32-445; NASA CR-50965

N63-22708 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A STUDY OF SOME TRANSITION MATRIX ASSUMPTIONS IN CIRCUMLUNAR NAVIGATION THEORY
Ruben L. Jones and Alton P. Mayo. Oct 63, 38p
Technical note D-1812

N63-20889 OTS $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
TABLE OF ${}_2F_1$ (a, b;c;z) FOR a = 0(1/2)7, b = 0(1/2)7, AND c = 0(1/2)5/2 WITH COMMENTS ON CLOSED FORMS OF ${}_2F_1$ (a, b;c;z)
K. David Steidley. Sep 63, 28p refs
Technical note D-1735

AD-401 774 OTS $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
COMPUTING GOOD COEFFICIENTS FOR A LINEAR EVALUATION FUNCTION
James R. Slagle. 11 Mar 63, 17p refs
Contract AF19(628)500
Rept. no. 55G-3; AFESD-TDR-63-41

DESCRIPTORS: *Game theory, *Operations research, Mathematics, Computers, Programming (Computers),

An evaluation function is a function which evaluates positions in game-playing or which estimates the difficulty of subproblems or subproblem-method pairs in problem-solving. Six methods are presented for computing coefficients for a linear evaluation function. One of these methods is accompanied by plausibility arguments indicating that the method will compute good coefficients for the evaluation function for the checker machine of Arthur Samuel. (Author)

AD-401 223 OTS $9.60

Lockheed Missiles and Space Co., Sunnyvale, Calif.
SOME FORMULAS INVOLVING PRODUCTS OF TRIGONOMETRIC FUNCTIONS SPACED AT REGULAR INTERVALS. Technical rept. on Communications
Martin Blumberg. Dec 62, 111p refs
Rept. no. 6-90-62-125; N63-14629

DESCRIPTORS: *Trigonometry, *Complex variables, Integral equations, Numerical analysis, Equations, *Functions,

In the study of infinite arrays of line charges, there arise functions of the complex variable $z = x + jy$ involving products of trigonometric functions spaced at regular intervals. It has been found that these formulas can be reduced to a constant times the function of a multiple angle. Other formulas which may be of interest are derived from these. A compilation of the important formulas derived in the text, together with examples, is given in the appendix.

AD-403 431 OTS $6.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
SMALL SAMPLE SEQUENTIAL DETECTION
Robert Roy Boorstyn. Apr 63, 61p refs
Grant [AF-] AFOSR-62-295
Research rept. no. PIBMRI-1128-63; N63-15437

DESCRIPTORS: *Sequential analysis, *Statistical tests, Communication theory, Sampling, Signal-to-noise ratio, Errors, Probability, Feedback, Transformations (Mathematics), Statistical processes, Integral equations, Partial differential equations, Functions, Communication systems.

Wald's sequential analysis has been applied by many to problems in statistical communications. Here, these techniques are extended to the class of applications requiring small sample size, for which the elegant results of Wald are inapplicable. The method for solution is discussed in detail and then applied to three examples, two of which are of extreme importance in communications work--the normal (Gaussian) and Rayleigh distributions. Briefly, it is demonstrated that even for very small average sample sizes a significant improvement is obtained. The results are then compared with those of other tests--the sequential test without memory (null-zone detection) and fixed sample size tests. Some remarks are included on truncation of sequential tests, after which is appended a summary of the relevant results of statistical hypothesis testing. (Author)

PB-163 828 OTS $11.00

Numerical Analysis Research, U. of California, Los Angeles.
APPROXIMATION THEORY
E. W. Cheney. Aug 63, 150p refs
[Contract Nonr-233(02)]

DESCRIPTORS: *Numerical analysis, Theory,

Lectures: Elementary existence and uniqueness theorems for best approximations in normed linear spaces; Weierstrass, Bernstein, and Korovkin theorems; The Stone-Weierstrass Theorem and its corollaries; Gram Theorem, Cauchy Lemma; Fundamental sets, Müntz theorems; Clarkson-Erdös Theorem; Convexity, Hahn-Banach Theorem, separation theorems, Caratheodory Theorem; Theorem on approximating nonlinear functionals by linear functionals, alternation theorem; Haar Theorem, Strong Uniqueness Theorem; Comparison of best approximations on discrete sets and on continua; Characterization theorem for best generalized rational approximations; The classical rational approximation theorems on alternation and uniqueness; Existence of best rational and rational trigonometric approximations; Approximation in L^1-norm, Jackson and Markoff theorems; Baire Theorem j. g., Uniform Boundedness Theorem, Nikolaer-Losinskii-Kharshiladze theorems; Approximation by interpolation; The Fejér Theorem; Theorems of de la Vallée-Poussin, Jackson, Korneicuk Approximation by series of Tchebycheff polynomials; Bernstein's converse of the Jackson Theorem; Bernstein Lethargy Theorem; and Orthogonal polynomials, Stieltjes' Theorem.

Computing Devices

IS-721 OTS $0.75

Ames Lab., Iowa State Univ. of Science and Tech.
ADDSTORAGE FORTRAN FOR THE IBM 7074/2/4
D. R. Fitzwater, E. H. Hietbrink, and D. E. McFarland. Sep 63, 28p
Contract W7405-eng-82

IS-751 OTS $0.50

Ames Lab., Iowa State Univ. of Science and Tech.
AMES LABORATORY "SELECTIVE DISSEMINATION OF INFORMATION" COMPUTER SYSTEM
Charles Sage and D. R. Fitzwater. Sep 63, 13p
Contract W7405-eng-82

WAPD-T-1447 OTS $1.10

Bettis Atomic Power Lab., Pittsburgh, Pa.
THE SHIPPINGPORT DATA ACQUISITION SYSTEM
R. T. Dressler. Jan 62, 17p ref
Contract AT(11-1)GEN-14

HW-SA-2523 OTS $2.60

Hanford Atomic Products Operation, Richland, Wash.
ADVANCEMENTS IN HIGH SPEED SCANNING MONITORING SYSTEMS, HARDWARE AND LOGIC
R. Sherrard. 9 May 62, 21p
Contract AT(45-1)1350

PB-163 826 OTS. $12.00

Hughes Dynamics, Inc., Los Angeles, Calif.
REPORT ON A STUDY OF BEHAVIORAL FACTORS IN INFORMATION SYSTEMS
John A. Postley. [1963] 167p refs
Grant NSF-C265

DESCRIPTORS: *Computers, *Information retrieval, Effectiveness, *Attitudes, Tests,

This study seeks to evaluate the effects of behavioral factors on the attainment of the objectives of computer-based information retrieval systems. Evidence of the need for this study comes from the great variation in total effectiveness found in different information systems, each with similar operating environments and seeking similar objectives. In many of these cases, the main differing element is the attitudes of the people involved. The problem of assessing the impact of behavior in information systems, necessitates studying the system as planned as well as the operating system, the people involved, and the interaction among them. A test to measure attitudes toward computer-based information retrieval systems called MIDO, has been developed. An accurate description of the information system being evaluated must consider the organizational structure, both stated and real, and the different functions performed within the system. After an organization has been selected, described, and the people tested, a determination of the actual and potential effectiveness of the system must be made. A descriptive analysis of the system studied has been useful mainly as a means to identify problem areas in which special corrective measures could be applied. Steps in the development of an objective criteria rating system have been taken.

UCRL-6801 OTS $1.00

Lawrence Radiation Lab., Univ. of California, Livermore.
GROM: A TIME DEPENDENT, ONE-DIMENSIONAL, MULTIGROUP NEUTRON DIFFUSION THEORY REACTOR BURNUP CODE FOR THE IBM 7094
G. M. Benson and E. T. Collins. 30 Jun 62, 49p
Contract W7405-eng-48

AD-401 489 OTS $7.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
IMPROVED TX-2 GATED PULSE AMPLIFIER
John H. Reaves. 13 Feb 63, 75p
Contract AF19(628)500
Rept. no. 51G-1; AFESD-TDR-63-38

DESCRIPTORS: *Computer systems components, *Pulse amplifiers, *Gates (Circuits), Analysis, Recovery, Time, Operation, Capacitance, Resistance (Electrical), Damping, Theory, Mathematical analysis, Computers,

An improved gated pulse amplifier for use in the Lincoln Laboratory TX-2 computer and similar applications is described. The circuit is analyzed to determine the effect of the parameters on pulse width, recovery time, and other characteristics. A comparison of calculated and observed waveforms confirms the validity of an equivalent circuit that is introduced to explain the basic pulse forming action of the amplifier. (Author)

AD-401 111 OTS $4.60

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
DEVELOPMENT AND TESTING OF MOTION MEASURING INSTRUMENTATION FOR THE XCH-6 HYDROFOIL CRAFT
W. C. Blaiklock and E. W. Ferris. Jan 63, 47p refs
Contract Nonr 2695(00)
Rept. no. MPD 47.135(R)

DESCRIPTORS: *Hydrofoil boats, *Test equipment, Hydrodynamics, Instrumentation, Frequency modulation, Telemeter systems, Test methods, Noise (Radio), Distortion,

An instrumentation system has been developed to measure the motions in a seaway of the XCH-6 hydrofoil craft. Each parameter is detected by a transducer, and the data are transmitted to a receiving station by an FM/FM telemetry link. Data are recorded in the receiving station on magnetic tape. A test program was carried out. Machine analyses of portions of the resulting data were made to obtain frequency-amplitude spectra of pitch, roll, and heave parameters. In addition, the sea state at the craft was computed by means of analog computer operations on tail strut altitude and acceleration. The sea state was also recorded by a "Splashnik" sea state buoy. Examples of each of these spectra are presented. It was found that distortions were introduced into the spectra by the broad band noise of the system electronics. Methods of reducing such distortion are discussed, and recommendations for the improvement of the system are made. (Author)

AD-410 293 OTS $4.60

Institute of Aerophysics, U. of Toronto (Canada).
A REVIEW OF THE THEORY OF PHOTOELASTICITY
R. C. Tennyson. Dec 62, 44p refs
UTIA Review no. 23; N63-17626

DESCRIPTORS: *Photoelasticity, Theory, *Polariscopes, *Goniometers, Stresses, Measurement, Coatings, Plastics, Refractive index.

The theory of both the plane and circular polariscope employing the reflected light technique is developed. The solution for the principal stresses using goniometric compensation in conjunction with normal and oblique incidence readings for a two dimensional analysis is outlined in detail, with a suggested technique for plotting principal stress trajactories. Also discussed, are correction factors for the preceding analysis, such as the index of refraction and the reinforcing effect of birefringent coatings. (Author)

PB-181 557 OTS $1.25

Lessells and Associates, Inc., Boston, Mass.
PRELIMINARY ANALYSIS OF BENDING-MOMENT DATA FROM SHIPS AT SEA. Progress rept. no. 2, on Ship Response Statistics
D. J. Fritch, F. C. Bailey, and N. S. Wise. 27 Dec 63, 41p refs
Contract NObs-77139
Ship Structure Committee Serial no. SSC-153

DESCRIPTORS: *Ships (Nonmilitary), *Cargo ships, Ocean waves, Deformation, *Stresses, Measurement, *Strain gages, *Data processing systems.

Data playback, manual reduction and analysis techniques, and the automatic system to be used for future analysis are presented. Examples are given of some forms of presentation of long-term trends. Useful data have been obtained on over 85% of voyages representing three ship-years of operation of a C-4 dry cargo vessel on North Atlantic trade routes. Two complete voyages have been analyzed using manual techniques and the results of this analysis are presented. The maximum observed peak-to-peak variation of wave-induced stress was 8300 psi which occurred during a Beaufort 11-12 Sea. A prediction based on the limited amount of long-term data available from the two analyzed voyages yielded an extreme value of 10,290 psi for a year of operation of this ship type on North Atlantic route. Stress variations on the order of 9,000 psi have been observed during the dry docking of the two instrumented ships. (See also PB-181 504)

PB-181 509 OTS $1.25

Stevens Inst. of Tech., Hoboken, N. J.
AN INVESTIGATION OF MIDSHIP BENDING MOMENTS EXPERIENCED IN EXTREME REGULAR WAVES BY MODELS OF A TANKER AND A DESTROYER. Progress rept. no. 2, on Model in Extreme Waves
J. F. Dalzell. 3 Feb 64, 48p refs
Contract NObs-78211
Ship Structure Committee Serial no. SSC-156

DESCRIPTORS: *Ships, *Tankers, *Destroyers, Deformation, *Stresses, Measurement, Ship models, *Ocean waves, Statistical analysis.

This report summarizes experimental research to investigate the possibility of a physical upper limit on midship bending moments in tanker and destroyer type ships being reached in regular waves of height significantly less than the theoretical upper limit of stability for progressive waves ($h/\lambda = 1/7$). Each model was tested at various speeds in regular head and following towing tank waves of several different lengths and of a wide range of heights. The results were compared with those obtained previously for a modern cargo vessel. No significant upper limit of bending moment was found. However, the study establishes more firmly the grossly linear dependence of midship bending moment on wave height, even for extreme wave heights which may be encountered in service. These findings strengthened the case for determining design wave bending moments on the basis of statistical analyses of ocean waves and/or resulting bending moments. (See also PB-181 508)

PB-181 508 OTS $1.75

Stevens Inst. of Tech., Hoboken, N. J.
AN INVESTIGATION OF MIDSHIP BENDING MOMENTS EXPERIENCED IN EXTREME REGULAR WAVES BY MODELS OF THE MARINER TYPE SHIP AND THREE VARIANTS. Progress rept. no. 1, on Model in Extreme Waves
J. F. Dalzell. 15 Jan 64, 63p refs
Contract NObs-78211
Ship Structure Committee Serial no. 157

DESCRIPTORS: *Ships (Nonmilitary), *Cargo ships, Deformation, *Stresses, Measurement, Ship models, *Ocean waves, Statistical analysis.

This report summarizes experimental research to investigate the possibility of a physical upper limit on midship bending moments in the Mariner-type ship being reached in regular waves of height significantly less than the theoretical upper limit of stability for progressive waves ($h/\lambda = 1/7$). The experiments included variation of distribution of loading and of freeboard as model parameters. Each variation was tested at various speeds in regular head and following waves of several different lengths and of a wide range of heights. No significant upper limit of bending moment was found. However, the study establishes more firmly the grossly linear dependence of midship bending moment on wave height, even for extreme wave heights which may be encountered in service. These findings strengthened the case for determining design wave bending moments on the basis of statistical analyses of ocean waves and/or resulting bending moments.

Aerodynamics and Pneumatics

N63-21057 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
AERODYNAMIC DAMPING OF A 0.02-SCALE SATURN SA-1 MODEL VIBRATING IN THE FIRST FREE-FREE BENDING MODE
Perry W. Hanson and Robert V. Doggett, Jr. Sep 63, 36p refs
Technical note D-1956

N63-21055 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
APPLICATION OF TRANSTABILITY CONCEPT TO FLUTTER OF FINITE PANELS AND EXPERIMENTAL RESULTS
Sidney C. Dixon. Sep 63, 36p refs
Technical note D-1948

N63-21056 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
EFFECTS OF PEAK DECELERATION ON RANGE SENSITIVITY FOR A MODULATED-LIFT REENTRY AT SUPERCIRCULAR SPEEDS
Charlie M. Jackson, Jr., and Roy V. Harris, Jr. Sep 63, 26p refs
Technical note D-1955

N63-21065 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FLUTTER OF FLAT RECTANGULAR ORTHOTROPIC PANELS WITH BIAXIAL LOADING AND ARBITRARY FLOW DIRECTION
Herman L. Bohon. Sep 63, 35p refs
Technical note D-1949

N63-22945 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
STATIC LONGITUDINAL AERODYNAMIC CHARACTERISTICS AND SURFACE PRESSURE DISTRIBUTIONS FOR A 1/15-SCALE MODEL OF A MODIFIED FOUR-STAGE SCOUT VEHICLE
Thomas C. Kelly, Oct 63, 28p refs
Technical note D-2026

N63-22946 OTS $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
WATER-FILM COOLING OF AN 80° TOTAL-ANGLE CONE AT A MACH NUMBER OF 2 FOR AIRSTREAM TOTAL TEMPERATURES UP TO 3,000° R
Howard S. Carter, Oct 63, 34p refs
Technical note D-2029

N63-22947 OTS $0.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
WIND-TUNNEL INVESTIGATION AT HIGH SUBSONIC SPEED OF THE STATIC LONGITUDINAL STABILITY CHARACTERISTICS OF A WINGED REENTRY VEHICLE HAVING A LARGE NEGATIVELY DEFLECTED FLAP-TYPE CONTROL SURFACE
Paul G. Fournier, Oct 63, 22p refs
Technical note D-2030

N63-22944 OTS $2.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
WING PRESSURE MEASUREMENTS WITHIN THE PROPELLER SLIPSTREAM FOR LARGE-SCALE V/STOL WIND-TUNNEL MODELS SIMULATING TRANSITION
Matthew M. Winston and Robert J. Huston, Oct 63, 115p refs
Technical note D-2014

PB 163 862 OTS $2.60

[Office of Research Administration] Univ. of Michigan. Ann Arbor.
TRANSPORT PHENOMENA IN VERY DILUTE GASES, II
C. S. Wang Chang. Dec 50, 27p refs
Contract NOrd-7924
Rept. no. CM-654; ATI-94 436

DESCRIPTORS: *Superaerodynamics, Gases, *Transport properties, *Gas flow, Drag, Spheres, Flat plate models,

Calculations are given in detail for the case of a sphere moving through a Knudsen gas and the results are given only for the cases of (1) a small circular plate moving through a Knudsen gas and (2) the flow of a Knudsen gas through a narrow circular tube. (See also PB 162 896)

IS-460 OTS $2.60

Ames Lab., Iowa State Univ. of Science and Tech.
PROGRESS IN SINTERING
D. R. Wilder. 1962, 30p refs
Contract W7405-eng-82

ANL-FGF-337 OTS $9.60

Argonne National Lab., Ill.
ALLOY CHEMISTRY OF TRANSITION ELEMENTS
M. V. Nevitt. 30 Mar 62, 120p refs
Contract W31-109-eng-38
UAC-6374

ANL-FGF-334 OTS $1.10

Argonne National Lab., Ill.
THE DIFFUSION OF IRON AND CHROMIUM IN BETA URANIUM
S. J. Rothman, N. L. Peterson, and S. A. Moore. 1 May 62, 7p refs
Contract W31-109-eng-38

NAA-SR-8578 OTS $0.50

Atomics International, Canoga Park, Calif.
JOINING OF APM ALUMINUM ALLOYS FOR REACTOR FUEL APPLICATIONS
E. C. Supan, W. H. Friske, and G. V. Alm. 1963, 23p
Contract AT(11-1)GEN-8

NAA-SR-8507 OTS $0.50

Atomics International, Canoga Park, Calif.
PREPARATION OF URANIUM METAL BY CARBON REDUCTION
W. G. Smiley. 30 Oct 63, 15p refs
Contract AT(11-1)GEN-8

NAA-SR-8538 OTS $0.50

Atomics International, Canoga Park, Calif.
THERMAL EXPANSION OF URANIUM MONOCARBIDE
R. Mendez-Penolosa. 1963, 23p refs
Contract AT(11-1)GEN-8

BMI-1649 OTS $0.50

Battelle Memorial Inst., Columbus, Ohio.
EVALUATION OF ELECTRON-EMISSION BEHAVIOR FOR DETECTING CARBON IN TUNGSTEN AND RHENIUM
James B. Baker and Gordon B. Gaines. 24 Sep 63, 20p refs
Contract W7405-eng-92

BNL-825(PR-4) OTS $0.75

Brookhaven National Lab., Upton, N. Y.
HIGH-TEMPERATURE LIQUID-METAL TECHNOLOGY REVIEW. A bimonthly technical progress review.
Volume 1, no. 4. Aug 63, 41p
Contract AT(30-2)GEN-16
PR-4

PB-163 864 OTS $7.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
INVESTIGATION OF GALLING AND FRICTION CHARACTERISTICS OF TITANIUM ALLOYS. Final rept., 1 Jul 53-1 Sep 54
Eber W. Gaylord. 31 Oct 54, 72p refs
Contract DA36-061-ORD-361
WAL rept. no. 401/65-37

DESCRIPTORS: *Titanium alloys, Friction, Temperature, Coatings, Thermocouples.

The results of studies made to establish criteria for galling are presented. A method for measuring the interface temperature between two metals during dry rubbing is discussed. Results of rubbing tests of unalloyed, alloyed, and surface treated titanium specimens are given. The degree of improvement in friction and galling characteristics afforded by surface treatment is determined. (Author)

HW-SA-2527 OTS $2.60

Hanford Atomic Products Operation, Richland, Wash.
WELDABILITY OF METALS
E. B. LaVelle and D. L. Hovorka. 9 May 62, 24p refs
Contract AT(45-1)1350

NLCO-873 OTS $2.60

National Lead Co. of Ohio, Cincinnati.
HYDROMETALLURGICAL PROCESSING OF URANIUM-BEARING RESIDUE MATERIALS TO UF_4
J. H. Cavendish, H. M. Beers, and M. A. DeSesa.
Nov 62, rev. Apr 63. 27p refs
Contract AT(30-1)1156

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

TID-15571 · OTS $3.60

Argonne National Lab., Ill.
ENERGY-DEPENDENT MULTIPLE SCATTERING OF NEUTRONS IN THIN PLATES
R. O. Lane and W. F. Miller. Feb 62, 35p refs
Contract W31-109-eng-38
UAC-6102

ANL-FGF-339 OTS $1.10

Argonne National Lab., Ill.
A FILM COPYING TECHNIQUE FOR IMPROVING RADIOGRAPHIC CONTRAST
N. S. Beyer, Harold Berger, N. P. Lapinski, and I. R. Kraska. Apr 62, 10p refs
Contract W31-109-eng-38
UAC-6372

TID-15896 OTS $1.60

Argonne National Lab., Ill.
GAMMA-RAY INDUCED EXPANSION OF LITHIUM FLUORIDE
William Primak and Gene Wolfe. 7 Jun 62, 16p refs
Contract W31-109-eng-38
UAC-6342

ANL-6742 OTS $0.50

Argonne National Lab., Ill.
LABORATORY INVESTIGATIONS IN SUPPORT OF FLUID BED FLUORIDE VOLATILITY PROCESSES. PART I. THE FLUORINATION OF URANIUM DIOXIDE-PLUTONIUM DIOXIDE SOLID SOLUTIONS
R. L. Jarry, L. J. Anastasia, J. Fischer, L. E. Trevorrow, and T. D. Baker. Sep 63, 21p refs
Contract W31-109-eng-38

ANL-FGF-332 OTS $2.60

Argonne National Lab., Ill.
NEUTRON AND X-RAY DIFFRACTION STUDIES OF NONSTOICHIOMETRIC METAL HYDRIDES
S. S. Sidhu, N. S. Satya Murthy, F. P. Campos, and D. D. Zauberis. 14 Mar 62, 26p refs
Contract W31-109-eng-38
UAC-6209

ANL-FGF-335 OTS $1.60

Argonne National Lab., Ill.
NEUTRON RADIOGRAPHY: A NEW DIMENSION IN RADIOGRAPHY
Harold Berger. Mar 62, 20p refs
Contract W31-109-eng-38
UAC-6280

ANL-FGF-345 OTS $1.10

Argonne National Lab., Ill.
THE URANIUM MONOCARBIDE-PLUTONIUM MONOCARBIDE SYSTEM
S. Rosen and M. V. Nevitt. 2 May 62, 9p refs
Contract W31-109-eng-38
UAC-6408

NAA-SR-5201 OTS $0.75

Atomics International, Canoga Park, Calif.
THERMOPHYSICAL PROPERTIES OF IRRADIATED POLYPHENYL COOLANTS. PART III: THERMAL CONDUCTIVITY
G. Asanovich, R. S. Moore, and K. Koda. 15 Oct 63, 28p refs
Contract AT(11-1)GEN-8

BMI-1639(Del.) OTS $1.75

Battelle Memorial Inst., Columbus, Ohio.
PROGRESS RELATING TO CIVILIAN APPLICATIONS DURING JUNE, 1963
Russel W. Dayton and Ronald F. Dickerson. 1 Jul 63, 72p
Contract W7405-eng-92

BMI-1642(Del.) OTS $1.75

Battelle Memorial Inst., Columbus, Ohio.
PROGRESS RELATING TO CIVILIAN APPLICATIONS DURING JULY, 1963
1 Aug 63, 68p
Contract W7405-eng-92

BNL-6195 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
THE APPLICATION OF INERT FLUIDIZED BEDS TO THE VOLATILITY REPROCESSING OF REACTOR FUELS
W. H. Regan, J. J. Reilly, E. Wirsing, and L. P. Hatch. 27 Jul 62, 20p refs
Contract AT(30-2)GEN-16

BNL-5909 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
CONSTANCY OF COSMIC RAYS IN TIME
D. Haymann and O. A. Schaeffer. 27 Feb 62, 14p refs
Contract AT(30-2)GEN-16

BNL-6062 OTS $1.10

Brookhaven National Lab., Upton, N. Y.
ELECTRON MICROSCOPY OF FISSION FRAGMENT DAMAGE IN ALUMINUM-URANIUM FUEL ELEMENT
J. J. Kelsch and O. F. Kammerer. 19 Jun 62, 3p
Contract AT(30-2)GEN-16

BNL-794(T-303) OTS $0.50

Brookhaven National Lab., Upton, N. Y.
EVALUATION OF ATOMIC LEVEL WIDTHS
Nazakat Ullah. Apr 63, 17p 5refs
Contract AT(30-2)GEN-16
T-303

BNL-6148 OTS $3.60

Brookhaven National Lab., Upton, N. Y.
STUDIES ON URANIUM RECOVERY FROM UNIRRADIATED REACTOR FUEL ELEMENTS BY VOLATILE SEPARATION IN INERT FLUIDIZED BEDS
J. J. Reilly, W. H. Regan, E. Wirsing, and L. P. Hatch. 19 Jun 62, 32p refs
Contract AT(30-2)GEN-16

HW-SA-2452 OTS $1.10

Hanford Atomic Products Operation, Richland, Wash.
EFFECT OF BASE CATION ON THE CESIUM KINETICS OF CLINOPTILOLITE
L. L. Ames, Jr. Feb 62, 10p refs
Contract AT(45-1)1350

HW-SA-2566 OTS $2.60

Hanford Atomic Products Operation, Richland, Wash.
HANFORD EXPERIENCE IN THE RADIOLOGICAL MONITORING OF GROUND WATER
D. J. Brown and J. R. Raymond. 1 May 62, 23p refs
Contract AT(45-1)1350

HW-77089 OTS $0.75

Hanford Atomic Products Operation, Richland. Wash.
THE LIMITING CRITICAL CONCENTRATIONS FOR Pu^{239} AND U^{235} IN AQUEOUS SOLUTIONS
R. H. Masterson, J. D. White, and T. J. Powell. 18 Sep 63, 26p refs
Contract AT(45-1)1350

HW-SA-2620 OTS $1.10

Hanford Atomic Products Operation, Richland, Wash.
SOLVENT EXTRACTION OF CESIUM BY DIPICRYLAMINE
L. A. Bray, E. C. Martin, and R. L. Moore. 8 May 62, 8p refs
Contract AT(45-1)1350

HW-SA-2657 OTS $1.10

Hanford Atomic Products Operation, Richland, Wash.
SPECTROPHOTOMETRIC DETERMINATION OF NEPTUNIUM
Curtis A. Colvin. 12 Jun 62, 9p refs
Contract AT(45-1)1350

TID-15884 OTS $3.60

Knolls Atomic Power Lab., Schenectady, N. Y.
A TECHNIQUE FOR MEASURING THE NEUTRON CAPTURES IN U^{235} AND NATURAL BORON
D. A. Gavin, D. J. Anthony, T. F. Ruane, and P. J. Tetrault. 7 Jun 62, 40p refs
Contract W31-109-eng-52

TID-15924 OTS $1.60

Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
CLASSICAL DESCRIPTION OF DEUTERON STRIPPING IN A COULOMB FIELD
Richard H. Lemmer. 8 Jun 62, 21p refs
Contract AT(30-1)2098

UCRL-10516 OTS $2.00

Lawrence Radiation Lab., Univ. of California, Berkeley.
NEUTRON ENERGY SPECTRA FROM NUCLEI EXCITED BY μ^--MESON CAPTURE
Donald E. Hagge. 12 Jun 63, 85p refs
Contract W7405-eng-48

UCRL-10731 OTS $1.25

Lawrence Radiation Lab., Univ. of California, Berkeley.
PION-PION RESONANCES FROM PION-NUCLEON INELASTIC INTERACTIONS
Zaven G. T. Guiragossian. 13 Aug 63, 51p refs
Contract W7405-eng-48

UCRL-10965 OTS $2.25

Lawrence Radiation Lab., Univ. of California, Berkeley.
TRANSITION PATHS OF u^--MESONS CAPTURED IN SOLID LITHIUM
Coates R. Johnson. Aug 63, 105p refs
Contract W7405-eng-48

LAMS-2960 OTS $0.50

Los Alamos Scientific Lab., N. Mex.
IMPLICIT RADIATION DIFFUSION
Robert N. Thorn and Burton Wendroff. 15 Aug 63, 26p refs
Contract W7405-eng-36

NLCO-890 OTS $1.00

National Lead Co. of Ohio, Cincinnati.
SUMMARY TECHNICAL REPORT. Rept. for 1 Jul-30 Sep 63.
28 Oct 63, 44p refs
Contract AT(30-1)1156

NMI-7218-2 OTS $3.60

Nuclear Metals, Inc., Concord, Mass.
EVALUATION OF FIFTEEN OUTER TUBES OF ZIRCALOY-CLAD UNALLOYED URANIUM FOR THE HWCTR
A. B. Bremer. 1 Aug 62, 36p refs
Contract AT(30-1)1565

Elementary Particles

BNL-809(L-342) OTS $0.50

Brookhaven National Lab., Upton, N. Y.
MUON BIBLIOGRAPHY
Marjorie Comstock and Leon M. Lederman, comp.
Apr 63, 20p refs
Contract AT(30-2)GEN-16
L-342

UCRL-2426(Vol. III) OTS $2.25

Lawrence Radiation Lab., Univ. of California, Berkeley.
HIGH-ENERGY PARTICLE DATA. VOLUME III: KINEMATICS OF PARTICLES AS A FUNCTION OF MOMENTUM
W. Peter Trower. 1 Jul 63, 115p
Contract W7405-eng-48

Instruments and Installations

ANL-FGF-340 OTS $1.60

Argonne National Lab., Ill.
AN EVALUATION OF A FAST, SCINTILLATOR-POLAROID FILM CAMERA FOR NEUTRON IMAGE DETECTION
Harold Berger and L. R. Kraska. Apr 62, 11p refs
Contract W31-109-eng-38
UAC-6345

BMI-1648 OTS $1.25

Battelle Memorial Inst., Columbus, Ohio.
INDUSTRIAL ENVIRONMENTAL CONDITIONS OF SEALED RADIATION SOURCES. Topical rept.
Robert A. Ewing, Peter Gluck, Harvey B. Brugger, James E. Drennan, and Duane N. Sunderman.
10 Sep 63, 50p refs
Contract W7405-eng-92

BNL-6094 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
A BUBBLE CHAMBER TRACK-CENTERING DEVICE WITH DIGITIZED OUTPUT
Frederick Ayer, Eric Pickup, Edwin F. Rappe, and Gaylord Wall. Mar 62, 18p refs
Contract AT(30-2)GEN-16

BNL-6095 OTS $2.60

Brookhaven National Lab., Upton, N. Y.
A VERSATILE BUBBLE-CHAMBER TRACK MEASURING STAGE
Frederick Ayer II and Ernest M. Bolze. Mar 62, 25p refs
Contract AT(30-2)GEN-16

HW-78734 OTS $0.50

Hanford Atomic Products Operation, Richland, Wash.
DETECTION OF AIRBORNE PLUTONIUM USING ALPHA ENERGY ANALYSIS TECHNIQUES
D. P. Brown. 24 Oct 63, 10p refs
Contract AT(45-1)1350

HW-SA-2565 OTS $2.60

Hanford Atomic Products Operation, Richland, Wash.
THE INTRODUCTION OF NEW AND IMPROVED METHODS FOR WORK IN RADIATION ZONES IN PRODUCTION REACTORS AT HANFORD
George A. Fox. 11 Jun 62, 28p refs
Contract AT(45-1)1350

HW-78872 OTS $0.50

Hanford Atomic Products Operation, Richland, Wash.
PORTABLE RADIATION SURVEY INSTRUMENT
E. M. Sheen and W. G. Spear. 29 Oct 63, 8p refs
Contract AT(45-1)1350

UCRL-6911(Pt. 1) OTS $1.50

Lawrence Radiation Lab., Univ. of California, Livermore.
A HELIUM-3 NEUTRON SPECTROMETER WITH EXTENDED ENERGY RANGE. PART I: DESIGN AND DEVELOPMENT OF THE SPECTROMETER
W. Brown and L. Passell. May 62, 66p refs
Contract W7405-eng-48

UCRL-7427 OTS $1.25

Lawrence Radiation Lab., Univ. of California, Livermore.
SCATTERBRAIN: AN AUTOMATED FACILITY FOR CHARGED PARTICLE SCATTERING EXPERIMENTS
J. Benveniste, R. Booth, and A. Mitchell. 15 Jul 63, 53p refs
Contract W7405-eng-48

SLAC-18 OTS $2.50

Stanford Linear Accelerator Center, Stanford Univ., Calif.
TWO-MILE ACCELERATOR PROJECT. Quarterly status rept. 1 Apr-30 Jun 63.
Aug 63, 116p refs
Contract AT(04-3)400

Nuclear Engineering

IDO-28612 OTS $1.50

Aerojet-General Nucleonics, San Ramon, Calif.
ARMY GAS-COOLED REACTOR SYSTEMS PROGRAM. Quarterly progress rept. 1 Apr-30 Jun 63.
15 Aug 63, 64p refs
Contract AT(10-1)880

TID-15779 OTS $2.60

Argonne National Lab., Ill.
CONTAMINATION AND DECONTAMINATION STUDIES RELATED TO BOILING WATER REACTORS
D. Grosvenor, W. Seefeldt, and S. Vogler. Mar 62, 24p
Contract W31-109-eng-38
UAC-6208

TID-15774 OTS $1.60

Argonne National Lab., Ill.
SYMPOSIUM ON RADIATION DAMAGE IN SOLIDS AND REACTOR MATERIALS. SWELLING OF URANIUM
B. A. Loomis. 26 Mar 62, 17p refs
Contract W31-109-eng-38
UAC-6254

NAA-SR-8490 OTS $1.00

Atomics International, Canoga Park, Calif.
EXPERIMENTS WITH WATER-REFLECTED, UNDERMODERATED, ZIRCONIUM HYDRIDE CRITICAL ASSEMBLIES
L. I. Moss. 15 Sep 63, 44p refs
Contract AT(11-1)GEN-8

NAA-SR-8431 OTS $0.75

Atomics International, Canoga Park, Calif.
A MATHEMATICAL MODEL DESCRIBING THE DYNAMICS OF THE SRE CORE II
R. W. Keaten, A. L. Gunby, and W. J. Carlson. 15 Sep 63, 32p refs
Contract AT(11-1)GEN-8

BAW-1274 OTS $2.25

Babcock and Wilcox Co., Lynchburg, Va.
SPECTRAL SHIFT CONTROL REACTOR BASIC PHYSICS PROGRAM. MEASUREMENT AND ANALYSIS OF PERTURBED LATTICES OF SLIGHTLY ENRICHED UO_2 MODERATED BY D_2O-H_2O MIXTURES
T. C. Engelder, R. H. Clark, E. J. DeRoche, G. T Fairburn, and J. W. Hallam. Oct 63, 100p refs
Contract AT(30-1)2602

WAPD-T-1490 OTS $1.10

Bettis Atomic Power Lab., Pittsburgh, Pa.
MEASUREMENTS OF EXTRAPOLATION LENGTHS IN PULSED WATER SYSTEMS
J. A. DeJuren, R. Stooksberry, and E. E. Carroll. Mar 62, 5p refs
Contract AT(11-1)GEN-14

BNL-6142 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
BOILING POTASSIUM HEAT TRANSFER PROJECT LOOP DESIGN AND DEVELOPMENT
J. C. Chen. 30 Apr 62, 18p
Contract AT(30-2)GEN-16

RFP-329 OTS $0.50

Dow Chemical Co., Golden, Colo.
MANUAL FOR THE USE OF BOROSILICATE RASCHIG RINGS AS A FIXED NUCLEAR POISON
W. E. Schunter and R. W. Woodard. 3 Oct 63, 13p
Contract AT(29-1)1106

GEAP-3967(Rev.) OTS $1.00

General Electric Co., San Jose, Calif.
HIGH POWER DENSITY DEVELOPMENT PROJECT. 300 MWe HPD CONCEPTUAL DESIGN STUDY. Interim rept.
A. P. Bray and V. G. Grayhek. 22 Jun 62, 40p refs
Contract AT(04-3)361

TID-18582 OTS $21.00

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
A SYSTEM ANALYSIS OF THE LIQUID METAL FUEL REACTOR EXPERIMENT. Final technical rept.
Gilbert S. Stubbs, William H. Steigelmann, Edward W. Jones, Tsi C. Yen, and Musa Halev. 22 Jan 63, 390p
Contract AT(30-1)1484
F-A2199

UCRL-6901 OTS $0.75

Lawrence Radiation Lab., Univ. of California, Livermore.
ROOM TEMPERATURE CRITICAL MEASUREMENTS ON THORIUM-LOADED, GRAPHITE-MODERATED, ORALLOY-FUELED SYSTEMS
G. M. Benson and R. H. Fox. 30 Jun 62, 28p refs
Contract W7405-eng-48

LAMS-2955 OTS $0.75

Los Alamos Scientific Lab., N. Mex.
CRITICAL DIMENSIONS OF URANIUM(93.5)-GRAPHITE-WATER SPHERES, CYLINDERS, AND SLABS
William R. Stratton. May 62, 36p refs
Contract W7405-eng-36

LAMS-2984 OTS $0.50

Los Alamos Scientific Lab., N. Mex.
ULTRA HIGH TEMPERATURE REACTOR EXPERIMENT (UHTREX).
Quarterly status rept. for period ending 20 Sep 63.
Oct 63, 16p
Contract W7405-eng-36

NLCO-886 OTS $0.50

National Lead Co. of Ohio, Cincinnati.
DRILLING URANIUM BILLETS ON A LEBLOND-CARISTEDT RAPID BORER
R. J. Jansen. 13 Sep 63, 26p refs
Contract AT(30-1)1156

NMI-2804 OTS $9.10

Nuclear Metals, Inc., Concord, Mass.
THE STUDY OF BETA TREATMENT OF URANIUM
Progress rept. 1 Apt-31 Jul 61.
R. B. Russell and A. K. Wolff. 1 Sep 61, 108p refs
Contract AT(30-1)1565

K-1582 OTS $0.50

Oak Ridge Gaseous Diffusion Plant, Tenn.
A NUCLEARLY SAFE 12-1/4-IN. I.D. PACKED LIQUID ENTRAINMENT SEPARATOR
H. F. Henry and C. E. Newlon. 17 Oct 63, 13p refs
Contract W7405-eng-26

IDO-16885 OTS $2.00

Phillips Petroleum Co., Idaho Falls.
FUEL PLATE EXPERIENCE DURING THE SPERT I DESTRUCTIVE TEST SERIES WITH AN ALUMINUM-CLAD, PLATE-TYPE CORE
J. Dugone and D. D. Wieland. 24 Jul 63, 97p refs
Contract AT(10-1)205

IDO-16905 OTS $1.00

Phillips Petroleum Co., Idaho Falls.
NUCLEAR START-UP OF THE SPERT IV REACTOR
J. G. Crocker, J. E. Koch, Z. R. Martinson, A. M. McGlinsky, and L. A. Stephan. 24 Jul 63, 40p refs
Contract AT(10-1)205

IDO-16888 OTS $2.50

Phillips Petroleum Co., Idaho Falls.
SPERT II REACTOR FACILITY
C. R. Montgomery. 23 Aug 63, 145p refs
Contract AT(10-1)205

IDO-16920 OTS $1.25

Phillips Petroleum Co., Idaho Falls.
SPERT PROJECT. Quarterly tech. rept. Apr-Jun 63.
F. Schroeder, ed. 20 Sep 63, 52p refs
Contract AT(10-1)205

IDO-16903 OTS $1.50

Phillips Petroleum Co., Idaho Falls.
A STATISTICAL DETERMINATION OF THE REDUCED PROMPT NEUTRON GENERATION TIME, Λ/β, IN THE SPERT IV REACTOR
Roger Lee Johnson. 20 Aug 63, 60p refs
Contract AT(10-1)205

SRIA-113 OTS $0.75

Stanford Research Inst., Menlo Park, Calif.
CONTAINMENT OF FRAGMENTS FROM A RUNAWAY REACTOR. Technical rept. no. 6.
R. W. White and N. B. Botsford. 15 Sep 63, 34p
Contract AT(04-3)115
PGU-2164

WCAP-3722 OTS $7.60

Westinghouse Electric Corp., Pittsburgh, Pa.
A DIGITAL COMPUTER ANALYSIS OF CLOSED CYCLE WATER NUCLEAR POWER PLANT START-UP USING NATURAL CIRCULATION (THERMO-SYPHON CODE). Volume I.
A. N. Nahavandi, B. H. Axelson, G. B. Killinger, and A. H. Killinger. Feb 62, 72p refs
Contract AT(30-1)3064

Nuclear Reactions

BNL-6044 OTS $1.60

Brookhaven National Lab., Upton, N. Y.
CROSS SECTIONS OF 14.5 MEV NEUTRON REACTIONS WITH SPECIAL INTEREST IN CA^{47} FORMATION
Manny Hillman. 18 Jun 62, 12p refs
Contract AT(30-2)GEN-16

BNL-818(T-317) OTS $1.25

Brookhaven National Lab., Upton, N. Y.
OPTICAL MODEL ANALYSIS OF INELASTIC SCATTERING OF NEUTRONS BY HEAVY NUCLEI
S. O. Moore and E. H. Auerbach. Aug 63, 46p refs
Contract AT(30-2)GEN-16
T-317

Radioactivity

TID-15849 OTS $1.60

Argonne National Lab., Ill.
MEASUREMENTS OF LIFETIMES OF RADIOACTIVE SOURCES
J. E. Monahan, S. Raboy, and C. C. Trail. Apr 62, 19p refs
Contract W31-109-eng-38
UAC-6285

BNL-5924 OTS $3.60

Brookhaven National Lab., Upton, N. Y.
THE ANGULAR DEPENDENCE OF THERMAL NEUTRON SPECTRA IN LATTICES
Henry C. Honeck and Hiroshi Takahashi. Jan 62, 40p refs
Contract AT(30-2)GEN-16

HW-SA-2651 OTS $1.10

Hanford Atomic Products Operation, Richland, Wash.
PIPING AUTORADIOGRAPHY
L. D. Perrigo and W. E. Taylor. 25 Jun 62, 5p refs
Contract AT(45-1)1350

HASL-140 OTS $4.00

Health and Safety Lab., Atomic Energy Commission, New York.
FALLOUT PROGRAM. Quarterly summary rept. 1 Jun-1 Sep 63.
Edward P. Hardy, Jr., Joseph Rivera, and William R. Collins, Jr. 1 Oct 63, 321p refs

UCRL-13074 OTS $2.50

Lawrence Radiation Lab., Univ. of California, Livermore.
LABORATORY STUDIES OF THE RADIOACTIVE CONTAMINATION OF AQUIFERS
Melvin C. Schroeder and A. Ray Jennings. 28 Jun 63, 123p Prepared in cooperation with Texas Engineering Experiment Station and Texas A. and M. Coll.
Contract W7405-eng-48

LAMS-2879 OTS $0.50

Los Alamos Scientific Lab., N. Mex.
PLANTS AS MONITORS OF RADIOACTIVE CONTAMINATION OF THE ENVIRONMENT OF LOS ALAMOS, NEW MEXICO
E. R. Graham. 15 Aug 62, 18p refs
Contract W7405-eng-36

PWAC-397 OTS $0.75

Pratt and Whitney Aircraft Div., United Aircraft Corp., Middletown, Conn.
GEOMETRICAL ATTENUATION FACTORS FOR GAMMA RADIATION FROM CYLINDRICAL AND SPHERICAL SURFACE SOURCES
15 Sep 63, 28p
Contract AT(30-1)2789

PERSONNEL SUPPLIES AND PERSONAL EQUIPMENT

DP-861 OTS $0.50

Savannah River Lab., Aiken, S. C.
USE OF VORTEX TUBE FOR COOLING WEARERS OF INDUSTRIAL PROTECTIVE CLOTHING
J. M. Alexander, J. J. Croley, Jr., and R. R. Messick. Oct 63, 29p refs
Contract AT(07-2)1

PHYSICS

N63-21335 OTS $7.60

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
ELECTRON IMPACT 2s AND 2p EXCITATIONS OF ATOMIC HYDROGEN
Kazem Omidvar. Apr 63 72p refs.
Report no. X-640-63-54; TM-X-50562

figuration of the CF_3 group with respect to the plane of the benzene ring, and (b) Electrostatic deformation of the electron distribution about the fluorines in the CF_3 group. Our results for the benzotrifluorides and values reported earlier for the cis F-CF_3 coupling in $CF_3CX{=}CFY$ compounds are consistent with little or no hindrance to CF_3 group rotation in the latter. (Author)

AD-403 806 OTS $1.60

Noyes Chemical Lab., U. of Illinois, Urbana.
ELECTRON COUPLING OF NUCLEAR SPINS. VII. J_{FF} FOR 2-FLUOROBENZOTRIFLUORIDES. Technical rept. no. 63
H. S. Gutowsky and V. D. Mochel. 7 Apr 63, 16p refs
Contract Nonr-1834(13)

DESCRIPTORS: *Benzenes, *Fluorides, Molecular properties, *Nuclear spins, Electrons, Distribution, *Field theory, *Nuclear magnetic resonance, Spectroscopy,

The nmr spectra of several 2-F, 6-X-benzotrifluorides yield values for J_{FF} between the 2-fluorine and the fluorines in the CF_3 group of 13 to 34 cps, depending upon the 6-substituent. Furthermore, the magnitude of this J_{FF} is proportional to the chemical shift of the CF_3 group and to the size of the 6-substituent. Two related factors appear to be involved: (a) The rotational con-

Electronics

AD-403 278 OTS $1.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE MATRIX MANIPULATION OF BILINEAR TRANSFORMATIONS
H. M. Altschuler. 9 Apr 63, 15p refs
Grant AF-AFOSR-62-295
Research rept. no. PIBMRI-1137-63; N63-15190

DESCRIPTORS: *Matrix algebra, *Transformations (Mathematics), *Microwave networks, Networks,

The matrix character of bilinear transformations is explored, "bilinear matrices" are described, and the rules which govern their use are established. Bilinear matrices find their application is simplifying many manipulations which involve bilinear transformations. Several simple examples of such applications are given and short tables of bilinear matrices pertinent to microwave networks are included. (Author)

N63-22572 OTS $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
SHEATH NEAR A PLANE ELECTRODE BOUNDING A COLLISIONLESS PLASMA IN A MAGNETIC FIELD
Arthur W. Goldstein. Oct 63, 39p
Technical note D-1992

Solid State Physics

NAA-SR-8108 OTS $0.50

Atomics International, Canoga Park, Calif.
PLASTIC DEFORMATION OF URANIUM CARBIDE CRYSTALS
G. G. Bentle, F. E. Ekstrom, and R. Chang. 30 Sep 63, 25p refs
Contract AT(11-1)GEN-8

NAA-SR-8403 OTS $0.50

Atomics International, Canoga Park, Calif.
ROLE OF BORON IN GROWTH OF BERYLLIA SINGLE CRYSTALS
S. B. Austerman. 30 Sep 63, 15p refs
Contract AT(11-1)GEN-8

NAA-SR-8361 OTS $0.50

Atomics International, Canoga Park, Calif.
ROLE OF PHOSPHORUS IN GROWTH OF BERYLLIA SINGLE CRYSTALS
S. B. Austerman. 30 Sep 63, 16p refs
Contract AT(11-1)GEN-8

NAA-SR-8377 OTS $1.00

Atomics International, Canoga Park, Calif.
TRANSLATION-PERMUTATION OPERATION ALGEBRA FOR THE DESCRIPTION OF CRYSTAL STRUCTURES. I. IDEAL CLOSEST PACKING
W. G. Gehman. 30 Sep 63, 39p refs
Contract AT(11-1)GEN-8

GEMP-243 OTS $1.50

General Electric Co., Cincinnati, Ohio.
COMPUTER PROGRAMS DESCRIBING COLLISION CASCADES IN BINARY MATERIALS. III. BODY-CENTERED CUBIC AND FACE-CENTERED CUBIC STRUCTURES
D. G. Besco and J. R. Beeler, Jr. Aug 63, 59p refs
Contract AT(40-1)2847

UCRL-10701 OTS $2.25

Lawrence Radiation Lab., Univ. of California, Berkeley.
PREDICTION OF HIGH TEMPERATURE METALLIC PHASE DIAGRAMS
Leo Brewer. Jul 63, 101p refs
Contract W7405-eng-48

AD-401 398 OTS $5.60

Lincoln Lab., Mass. Inst. of Tech., Lexington,
CHEMICAL BEHAVIOR OF SEMICONDUCTORS: ETCHING CHARACTERISTICS
H. C. Gatos and M. C. Lavine. 2 Jan 63, 59p refs
Contract AF19(628)500; Contract SD-90
Technical rept. no. 293; AFESD-TDR-63-33

DESCRIPROTS: *Semiconductors, Surfaces, Chemical properties, *Electrochemistry, Reaction kinetics, *Crystal structure, Impurities, Electrolytes, *Crystal lattice defects,

The chemical properties of semiconductor surfaces are of great importance in semiconductor science and technology. Many physical properties are directly affected by the chemical characteristics of the surface. This report is primarily concerned with the chemical properties pertaining to chemical etching. These properties are generally a function of orientation, crystal structure, impurity concentration and other parameters. The more pertinent of these parameters are discussed in some detail. Typical experimental findings are included. (Author)

N63-22890 OTS $1.60

Space Technology Labs., Inc., Redondo Beach, Calif.
CHARGED PARTICLE RADIATION DAMAGE IN SEMICONDUCTORS, III: THE ENERGY DEPENDENCE OF PROTON DAMAGE IN SILICON. Revision
G. W. Simon, J. M. Denney, and R. G. Downing.
15 Feb 63, 12p refs
Contract NAS5-1851
Report no. 8653-6005-KU-001; NASA CR-51532

N63-22891 OTS $6.60

Space Technology Labs., Inc., Redondo Beach, Calif.
CHARGED PARTICLE RADIATION DAMAGE IN SEMICONDUCTORS, IV: HIGH ENERGY PROTON RADIATION DAMAGE IN SOLAR CELLS
J. M. Denny, R. G. Downing, M. E. Kirkpatrick, G. W. Simon, and W. K. Van Atta. 20 Jan 63, 63p refs
Contract NAS5-1851
Report no. 8653-6017-KU-000; NASA CR-51531; NP-13031

N63-22892 OTS $8.10

Space Technology Labs., Inc., Redondo Beach, Calif.
CHARGED PARTICLE RADIATION DAMAGE IN SEMICONDUCTORS, V: EFFECT OF 1 MEV ELECTRON BOMBARDMENT ON SOLAR CELLS
J. M. Denney, R. G. Downing, W. I. Hoffnung, and W. K. Van Atta. 11 Feb 63, 82p refs
Contract NAS5-1851
Report no. 8653-6018-KU-000; NASA CR-51529

N63-22893 OTS $2.60

Space Technology Labs., Inc., Redondo Beach, Calif.
CHARGED PARTICLE RADIATION DAMAGE IN SEMICONDUCTORS, VI: THE ELECTRON ENERGY DEPENDENCE OF RADIATION DAMAGE IN SILICON SOLAR CELLS
J. M. Denney, R. G. Downing, G. W. Simon, and W. K. Van Atta. 13 Feb 63, 29p refs
Contract NAS5-1851
Report no. 8654-6019-KU-000; NASA CR-51533

Thermodynamics

PB 163 863 OTS $9.10

Delaware Univ., Newark.
HEAT TRANSFER TO BOILING LIQUIDS UNDER CONDITIONS OF HIGH TEMPERATURE DIFFERENCE AND FORCED CONVECTION. Final technical rept.
S. Rankin. 20 Feb 58, 104p refs
Contract DA36-034-ORD-1797
Rept. no. UD-FB-13; AD-202 729; OOR-1366-...

DESCRIPTORS: *Heat transfer coefficients, *Film boiling, *Refrigerants, Methanols, *Heat exchangers, Fluid flow,

Heat transfer coefficients were determined for forced convection film boiling under conditions of high temperature difference. The studies were made with 2 different liquids, Freon-113 and methanol. The liquid flowed vertically upwards inside a 4-ft length of steam-jacketed Everdur pipe of 1.06 in. id. The liquid entering the test section was slightly above 1 atm pressure and a few degrees below its boiling point. Data were obtained at entering liquid velocities of from 1.0 to 8.5 fps. and with wall-to-fluid temperature differences which ranged from a maximum of 320°F down to values around 80°F where nucleate boiling was encountered. Peak heat flux data and pressure drop data were also obtained in most cases. The heat transfer coefficients varied from around 58 Btu/(hr)(°F)(sq ft) at the lowest temperature differences to around 44 Btu/(hr)(°F)(Sq ft)at the highest temperature differences. The effect of entering liquid velocity was quite small; at any given temperature difference, the velocity differences affected the magnitude of the heat transfer coefficients by no more than ±10%. An equation was derived for prediction of the coefficients of heat transfer for this case (DDC abstract)

N63-22712 OTS $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station Va.
SPECTROMETRIC MEASUREMENTS OF GAS TEMPERATURES IN ARC-HEATED JETS AND TUNNELS
David H. Greenshields, Oct 63, 23p refs
Technical note D-1960

NYO-9459 OTS $7.60

Massachusetts Inst. of Tech., Cambridge.
THERMAL CONDUCTANCE OF METALLIC SURFACES IN CONTACT
John Jewett Henry. Feb 63, 71p refs
Contract AT(30-1)2079

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

IS-700 OTS $5.50

Ames Lab., Iowa State Univ. of Science and Tech.
CHEMISTRY, ENGINEERING, METALLURGY, PHYSICS, AND REACTOR DIVISIONS. Annual summary research rept. 1 Jul 62-30 Jun 63
Sep 63, 445p refs
Contract W7405-eng-82

AD-255 773 OTS $1.60

Bulova Research and Development Labs., Inc., Woodside, N. Y.
AUDITRAN MOD. I: VOICE CODING SYSTEM.
Progress rept. no. 1, Oct 60-Apr 61
R. J. Bibbero. 11 Apr 61, 18p
Technical rept. no. SP-939-1

DESCRIPTORS: *Speech representation, Signals, Pattern recognition, *Coding, Data processing systems, Electronic equipment,

The AUDITRAN Mod. 1 facility has been developed to investigate the waveform envelope system of voice coding. Construction was initiated in October of 1960 and is essentially complete. Magnetic tape data handling and storage and analog processing is utilized in this equipment. This report describes the technical features of the equipment, specific envelope generating circuitry, and results of some preliminary system tests. (Author)

Communication Theory

AD-402 989 OTS $2.60

Electronic Systems Div., Air Force Systems Command, Bedford, Mass.
SPEECH-INTELLIGIBILITY AND TALKER-RECOGNITION TEST OF AIR FORCE VOICE COMMUNICATION SYSTEMS
Stephen E. Stuntz. Feb 63, 26p refs
ESD-TDR-63-224

DESCRIPTORS: *Voice communication systems, *Speech recognition, *Speech transmission, Air Force research, Telephone communication systems

Word-intelligibility (psycho-acoustic), Articulation Index (electrical) and voice recognition tests were made on the Thule, Greenland, to Cape Dyer, Baffin Island, link of the DEWDROP tropospheric-scatter communication system, and on the Gander, Newfoundland, to Harmon Air Force Base, Newfoundland, link of the POLEVAULT tropospheric-scatter communication system, and compared against similar tests taken on a laboratory reference system. Harvard phonetically-balanced (PB) word-lists were used in the psycho-acoustic tests; an abbreviated octave-band form of the Articulation Index procedure (after Kryter) was the basis of the electrical tests. These two measures agreed in ranking the three systems in order of intelligibility from highest to lowest: laboratory, POLEVAULT and DEWDROP. It is concluded that the Articulation Index technique suitably modified, is feasible and useful for voice-system performance evaluation and quality control testing. It is also concluded, tentatively, that system characteristics affecting intelligibility do not necessarily affect listeners' ability to recognize individual talkers. (Author)

N63-22895 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ERROR PROBABILITIES FOR RICIAN FADING MULTICHANNEL RECEPTION OF BINARY AND N-ARY SIGNALS
William C. Lindsey. 3 Jun 63, 24p refs
Contract NAS7-100
Technical rept. no. 32-450; NASA CR-51853

AD-400 949 OTS $12.50

System Development Corp., Santa Monica, Calif.
RESEARCH DIRECTORATE REPORT
C. W. Churchman, J. D. Madden, and C. Baum, ed.
Jan 63, 172p refs
Technical memo. no. TM-530/006/00

DESCRIPTORS: *Communication theory, *Artificial intelligence, Bionics, Monte Carlo method, Decision making, Computer logic, Networks, Operations research, Data processing systems, Automatic, Effectiveness,

Contents:
Artificial intelligence research
Information processing research
Decision processes research
Mathematics and operations research
Education research and development
Information retrieval and linguistics
Systems simulation research laboratory
Programming languages research
Research directorate books

SOCIAL SCIENCES

PB-163 856 OTS $9.10

Air Force Inst. of Tech. Wright-Patterson AFB, Ohio. School of Systems and Logistics
ANALYSIS OF COSTS AND BENEFITS OF ELECTRONIC DATA PROCESSING SYSTEMS
Ivan B. Thompson and Howard A. W. Tibbs (Master's thesis). Jun 63, 103p refs
Rept. no. SLSR-6-63

DESCRIPTORS: *Logistics, *Air Force equipment, *Data processing systems, Economics, *Costs, Management engineering.

The efforts of this study have been directed to showing the usefulness of viewing alternative management information systems within an economic framework. The economic factors involved are those of costs and benefits. An analysis of the costs and benefits to be considered in choosing among alternative management information systems is presented in detail. (Author)

PB-163 859 OTS $9.60

Air Force Inst. of Tech. Wright-Patterson AFB, Ohio. School of Systems and Logistics.
ANALYSIS OF STANDARDIZING PLANS IN THE TRANSFER OF INVENTORY MANAGEMENT RESPONSIBILITIES
John J. Ryan and William B. Linthicum (Master's thesis). Jun 63, 140p refs
Rept. no. SLSR-9-63

DESCRIPTORS: *Logistics, *Air Force equipment, Control, Management engineering, Documentation, *Standardization.

The objectives of this research on the transfer of inventory management responsibility are: 1. To develop a standard plan for the transfer of IM responsibility between AMAs. 2. To present recommendations for improving the guidance given by AFLC to the AMAs concerning the transfer of IM responsibility.

PB-163 853 OTS $4.60

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio, School of Systems and Logistics.
AN EXAMINATION OF LOGISTIC RESOURCES INFLUENCING AIRCRAFT SUPPORT CAPABILITY OF BASES
Robert H. Ferris and Herschell O. Womack (Master's thesis). Jun 63, 47p refs
Rept. no. SLSR-3-63

DESCRIPTORS: *Logistics, *Air Force equipment, *Aircraft, *Ground support equipment, *Military facilities, Management engineering,

The support capacity of those resources comprising the logistic base on which demands are placed by operational units of the U.S. Air Force would permit maximum consolidation of aircraft on a minimum number of bases. However, the behavior characteristics of each of these resources is unique, requiring that the investment in each be tailored to the need. Base assets, as one category of resource, respond favorably to increased workloads, evidencing very real economies to scale. The maintenance management organization, by contrast, evidences limitations which can be overcome only by enhancing its capacity for responsiveness, either by decentralizing responsibility to parallel and semi-autonomous subdivisions within the maintenance complex, or otherwise by grooming a cadre of management personnel with greater ability to respond to demands with the assets at hand and with a minimum of delay. (Author)

PB-163 852 OTS $14.00

Air Force Inst. of Tech. Wright-Patterson AFB, Ohio. School of Systems and Logistics
CONTROL AND REPORTING OF REPARABLES AT BASE LEVEL
Earl H. Gordon and Wesley J. Burnett (Masters thesis) Jun 63, 205p refs
Rept. no. SLSR-2-63

DESCRIPTORS: *Logistics, *Air force equipment, *Maintenance, Control, Reports, Management engineering.

Reparables are generated at three different types of activity: maintenance activities located at Air Materiel Area depots, contractor-operated maintenance activities, and Air Force bases. Each of these activities ship reparable items to the appropriate SRA whenever it is determined that an item cannot be repaired at the station where the reparable is generated. Current Air Force policy requires all of these activities - AMA's, contractors, and Air Force bases - to report all NRTS actions through the maintenance data collection system so that the IM will have complete NRTS information. To identify all of the voids in the system and prescribe effective corrective action, a complete study of all thre three types of activity where reparables are generated would be required. This research is limited to the Air Force base aspects of the over-all problem.

PB-163 860 OTS $10.10

Air Force Inst. of Tech. Wright-Patterson AFB, Ohio. School of Systems and Logistics.
CONTROL OF ACCOUNTABILITY OF CAT II REPARABLES THROUGH BETTER USE OF FORMS
Carris L. Radcliffe (Master's thesis). Jun 63, 127p refs
Rept. no. SLSR-10-63

DESCRIPTORS: *Logistics, *Air Force equipment, *Maintenance, Control, *Costs, Management engineering.

The scope of this thesis has been delimited to one segment of the broad reparable program. The procedure used at base level to control and to account for reparables is researched with the objective of maintaining or improving control and accountability of reparables while reducing and standardizing the number of forms used for the processing of reparables. This research entails an analysis of the reparable from the moment it is removed from the aerospace equipment, bench checked and repaired, held in maintenance for repair or sent to the depot for repair. Concurrent with the analysis for the flow of the reparable is an investigation of the forms used by Air bases of seven major air commands during the processing of reparables.

PB-163 854 OTS $12.00

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio, School of Systems and Logistics
INCOMPATIBILITY BETWEEN REQUIREMENTS DETERMINATION AND DISTRIBUTION CONTROLS
Donald B. Russell and Herbert H. Johnson (Master's thesis). Jan 63, 161p refs
Rept. no. SLSR-4-63

DESCRIPTORS: *Logistics, *Air Force equipment, *Military requirements, *Distribution (Economics), Consumption, Control, Management engineering.

This study is limited to an analysis of the failures or shortcomings of the system which permit a lapse in continuity, loss of integrity, or lack of control, in the area of requirements and distribution. The analysis is further restricted to follow-on spares, as distinguished from initially provisioned spares; to consumption type items rather than replacement type items; to requirements computed by Air Force AMA Inventory Managers (IM), as contrasted with requirements computed by other activities such as AFLC System Support Managers (SSM).

PB-163 857 OTS $10.10

Air Force Inst. of Tech. Wright-Patterson AFB, Ohio. School of Systems and Logistics.
INITIAL SPARES PROVISIONING FOR ICBM SYSTEMS
Paul F. Slowiak (Master's thesis). Jun 63, 127p refs
Rept. no. SLSR-7-63

DESCRIPTORS: *Logistics, *Air Force equipment, *Guided missiles (Surface-to-surface), *Guidance, Management engineering.

The scope of the study encompasses logistic support problems encountered in the acquisition and operational phases of Inter-Continental Ballistic Missile Systems. Organizational and functional responsibilities, from Air Force to Base level, are discussed where a cause and effect relationship to the problem exists. The Titan II and Minuteman programs are the principle subjects of this study with particular emphasis on management practices in provisioning procedure, however, reference is made to the Atlas program in several sections of the thesis. (Author)

PB-163 858 OTS $7.60

Air Force Inst. of Tech. Wright-Patterson AFB, Ohio. School of Systems and Logistics
MANAGEMENT OF INSTALLATION-ENGINEERING AND INSTALLATION OF GROUND COMMUNICATIONS ELECTRONICS SYSTEMS
Ernest C. Butler and Albert D. Smith (Master's thesis). Jun 63, 72p refs
Rept. no. SLSR-8-63

DESCRIPTORS: *Logistics, *Air Force equipment, *Early warning systems, *Communication systems, *Electronic equipment, Installation, Engineering, Management engineering.

This paper contains an analysis of the management methods applicable to the installation-engineering and installation phases of establishing a ground communications-electronics facility or system. The procedures for establishment of a requirement for a ground communication-electronics facility or system are reviewed along with the assignment of responsibility for management of resources for acquisition of communications facilities and systems. In addition, the criteria for selection of management methods applicable to installation-engineering and installation of communications-electronics facilities and systems are evaluated and an examination is made to determine if duplication of responsibility by different Air Force commands for installation-engineering and installation of ground communications-electronics facilities and systems exists. (Author)

PB-163 851 OTS $8.10

Air Force Inst. of Tech. Wright-Patterson AFB, Ohio. School of Systems and Logistics
A STUDY OF MAINTENANCE AND SUPPLY SUPPORT FOR USAF COUNTERINSURGENCY WEAPON SYSTEMS
Elmer E. Black and Sam Payne (Master's thesis). Jun 63, 82p refs
Rept. no. SLSR-1-63

DESCRIPTORS: *Logistics, *Air Force equipment, *Counter insurgency, *Weapons system, *Aircraft, Maintenance, Ground support systems, Management engineering.

This study has been limited to the maintenance and supply support of counterinsurgency (COIN) aircraft and their supporting aerospace ground equipment. The maintenance support consists of organizational and field maintenance. The supply support consists of initial support on deployment, re-supply on a short term basis, and a transition to sustained support to meet the requirements of the operation for an indefinite period of time. Petroleum and ammunition are excluded because of their peculiar characteristics which require special procedures. In addition to the procedures and activities of maintenance and supply, attention has been directed toward personnel qualifications and equipment authorizations. (Author)

PB-163 855 OTS-$10.50

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics
UNIFORM CONTRACT MANAGEMENT OF PRODUCTION AND INDUSTRIAL RESOURCES
Stanley W. Potts and Robert L. Mallowitz (Master's thesis). Jun 63, 136p refs
Rept. no. SLSR-5-63

DESCRIPTORS: *Logistics, *Air Force equipment, *Armed forces procurement, *Industrial production, Personnel, Management engineering

Contents:
A conceptual analysis of the problem
Basic contract management guidance
Organizations and philosophies of contract management
Existing interchange of contract management
The role of production and industrial resources
Analysis
Conclusions and recommendations

PB-163 868 OTS $2.60

Teachers Coll., Columbia Univ., New York.
PROBABILITY AND STATISTICS IN ITEM ANALYSIS AND CLASSIFICATION PROBLEMS. A REPRESENTATION OF THE JOINT DISTRIBUTION OF RESPONSES TO n DICHOTOMOUS ITEMS
Raj Raghu Bahadur. Jan 59, 27p refs
SAM rept. no. 59-42

DESCRIPTORS: *Sociometrics, *Statistical analysis, Analysis, Distribution, Probability, Population,

Consider a specified set of n dichotomous items with a joint probability distribution given by p. Let $p_{(1)}$ denote the joint distribution of the n items when they are independent with the same marginal probabilities as under p. Suppose we represent $p = p_{(1)} \cdot f$. An explicit expression is obtained for the correction factor f in terms of the n marginal probabilities and $2^n - n - 1$ correlation parameters. Certain formal models of dependence, suggested by this expression for f, are defined and discussed. It is pointed out that under certain conditions, the probability distribution of the "total score" throws some light on which model of dependence is appropriate in a given case. A generalization of this approach to the case when the items are not necessarily dichotomous is also described. (Author)

PB-163 869 OTS $1.60

Teachers Coll., Columbia Univ., New York.
PROBABILITY AND STATISTICS IN ITEM ANALYSIS AND CLASSIFICATION PROBLEMS. ON CLASSIFICATION BASED ON RESPONSES TO n DICHOTOMOUS ITEMS
Raj Raghu Bahadur. Sep 59, 20p refs
SAM rept. no. 60-13

DESCRIPTORS: *Sociometrics, *Statistical analysis, Analysis, Distribution, Probability, Population,

This report describes a procedure for classifying an individual into one of two groups on the basis of his responses to a given set of dichotomous items together with a procedure for computing the resulting "distance" between the groups. The square root of the Kullback-Leibler information number is used as a plausible distance function. The method relies on an approximation to a given joint probability distribution of response patterns. This approximation is used in constructing the likelihood ratio statistic, which serves as an index for classification. Under reasonable conditions this method serves as an approximation to an optimum classification procedure. (Author) (See also PB-163 868)

PB-163 870 OTS $2.60

Teachers Coll., Columbia Univ., New York.
PROBABILITY AND STATISTICS IN ITEM ANALYSIS AND CLASSIFICATION PROBLEMS. AN EMPIRICAL BAYES APPROACH TO NON-PARAMETRIC TWO-WAY CLASSIFICATION
Milton Vernon Johns. Sep 59, 22p refs
SAM rept. no. 60-16

DESCRIPTORS: *Sociometrics, *Statistical analysis, Analysis, Distribution, Probability, Population.

This report considers the problem of classifying an individual into one of two categories in the non-parametric case. Classification procedures are proposed which make use of all observations previously taken on individuals independently selected from the same population. These procedures have risks which are asymptotically optimum as the number of prior observations becomes large. The loss due to misclassification is assumed to depend on the value of a random variable associated with the individual but not observed at the time of classification. The case where only one of the losses due to misclassification of individuals previously selected from the population is known is also considered, and similar results are obtained. (Author) (See also PB-163 869)

Documentation

PB-163 829 OTS $17.50

College of Aeronautics, Cranfield (Gt. Brit.).
A REPORT ON A TEST OF THE INDEX OF METALLURGICAL LITERATURE OF WESTERN RESERVE UNIVERSITY. Rept. on Aslib-Cranfield Research Proj.
Lean Aitchison and Cyril Cleverdon. Oct 63, 280p refs
Grant NSF-

DESCRIPTORS: *Information retrieval, *Subject indexing, *Indexes, Coding, Tests, Documentation.

For many years the index to metallurgical literature at the Center for Documentation at Western Reserve University has been recognised as one of the most advanced indexing systems in use. It has been developed over many years with the assistance of grants from the American Society of Metals, and was put on an operational basis in 1960, when it was made available to members of the Society by subscription. At Cranfield, a by-product of the test on the efficiency of indexing systems had been the development of a method for testing existing systems. The opportunity of trying-out this method on the W. R. U. index was greatly appreciated by the Cranfield group; that it was an experiment in the use of the technique, equally as much as a test of the W. R. U. index, was accepted by both groups from the start. However, as the work developed, it became clear that the test was also becoming a research investigation in its own right, and that it was making significant additions to our knowledge of the operation of indexing systems. The report covers all three stages of this work. (Author)

PB-156 792-S OTS $4.60

[Defense Documentation Center, Alexandria, Va.].
PANEL ON PERSONNEL STANDARDS FOR MILITARY LIBRARIANS. ANNUAL MILITARY LIBRARIAN'S WORKSHOP (NO. 4) [SPONSORED BY ARMED SERVICES TECHNICAL INFORMATION AGENCY, 7 OCTOBER 1960]. Supplement Workshop Papers [1960] 46p
AD-243 001

DESCRIPTORS: *Documentation, *Library science, *Indexes, Libraries, *Conferences, Scientific reports, Bibliographies, *Data processing systems,

Contents:
A review and suggested new programs
Cooperative projects following completion of union list of serials
A bibliography clearinghouse and index
Size and services of a school library
Draft standards, school library
Draft standards, technical library

PB-163 840 OTS $8.10

Linguistics Research Center, U. of Texas, Austin.
[DEVELOPMENT OF A LINGUISTIC COMPUTER SYSTEM]. Rept. no. 16 (Final rept.)
W. P. Lehmann and E. D. Pendergraft. Jun 63, 85p refs
Grant NSF GN-54
Rept. no. LRC 63-P16

DESCRIPTORS: *Machine translation, Language, Programming (Computers), Algorithms, Cybernetics,

Four years of mechanical translation research are reported. A study was made of previous research efforts in the field. A working hypothesis was formulated for syntactic, semantic and pragmatic structural relations occurring in natural language. The general syntax of programming languages to be used in describing language data were derived from the formalized hypothesis, and programming criteria were extracted for

generalized analysis and synthesis algorithms. A generalized algorithm for interlingual transfer was also derived from formalized languages used for interlingual description. All of the processes are stochastic. A computer system to implement the theory is being programmed. Syntactic analysis and all of its supporting programs have been completed, as well as programs which maintain semantic descriptions. (Author)

PB-163 839 OTS $2.60

Linguistics Research Center, U. of Texas, Austin.
FORMATION AND TRANSFORMATION STRUCTURES, PART I
W. B. Estes, W. A. Holley, and E. D. Pendergraft.
May 63, 25p refs
Grant NSF GN-54; continuation of Grant NSF G-19277 and Contract DA36-039-sc-78911
Rept. no. LRC 63-WTM3

DESCRIPTORS: *Language, *Mathematical models, Mathematical logic,

The purpose of this paper is to develop a model for syntax of written language. In particular, certain general properties commonly associated with phrase-structure grammars are formalized in terms of a mathematical system. (Author)

PB-163 841 OTS $11.00

Linguistics Research Center, U. of Texas, Austin.
SYMPOSIUM ON THE CURRENT STATUS OF RESEARCH
W. P. Lehmann and E. D. Pendergraft. Oct 63, 148p
Grant NSF GN-54
Rept. no. LRC 63-SR1

DESCRIPTORS: *Conferences, Documentation, *Language, *Machine translation, *Programming (Computers), *Mathematical models, Research program administration,

Contents:
Machine Translation: An Introduction
Basic Methodology
Linguistic Research
Computer Programming
Mathematical Model for Syntax

IDO-16881 OTS $2.00

Phillips Petroleum Co., Idaho Falls.
EDP PROCEDURES IN TECHNICAL LIBRARY OPERATIONS
Hillis L. Griffin. 30 Jul 63, 91p
Contract AT(10-1)205

PB-181 558
Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Nov 63
OTS $1.25, $10/year

DESCRIPTORS: *Naval research, Scientific research, Jet engine fuels, Fuel contamination, Light transmission, Chemistry, Polymers, Electricity, Solar cells, Mechanics, Transducers, Radiation damage, Ceramic materials, Thermal stresses, Tungsten, Fracture (Mechanics), Metallurgy, Titanium alloys, Aluminum, Molybdenum, Iron, Fatigue (Mechanics), Refractory materials, Heat resistant metals and alloys, Chromium alloys, Oxidation, Tin alloys, Pressure vessels, Nuclear physics, Field theory, Very low frequency, Radio transmitters, Radio stations, Solid state physics, Sodium compounds, Chlorides, Dielectric properties, Ultrasonic radiation, Magnetostrictive elements, Reports, Patents

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The Problem of Jet Fuel Contamination, by J. A. Krynitsky
Transmission of Light Signals Over the Horizon, by J. A. Curcio
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Mechanics: Effects of radiation upon strain transducers. Thermal shock studies of ceramic materials. Some fracture properties of high-density tungsten notched round specimens. Modernization of NRL's electromagnetic shaker facility
Metallurgy and Ceramics: Determination of aluminum, molybdenum, and iron in titanium alloys. Metallographic study of fatigue damage. Influence of test conditions on the behavior of refractory metals. Oxidation of iron-chromium alloys in dry carbon dioxide. High-temperature oxidation of tin-aluminum alloys. Neutron dosimetry sampling of the OMRE pressure vessel and grid plates. Low-cycle, fatigue crack propagation
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U.S. DEPARTMENT OF COMMERCE FIELD OFFICES

SERVE THE BUSINESS COMMUNITY

The Department of Commerce maintains Field Offices to enable the business community to avail itself locally of Government facilities designed to promote commerce. Working closely with various units in the Department and, when necessary, with other Government agencies, the Field Offices provide business services to manufacturers, wholesalers, retailers, trade publications, trade associations, advertising agencies, research groups, financial institutions, and exporters and importers.

Experienced personnel will gladly assist in the solution of specific problems, explain the scope and meaning of regulations administered by the Department, and provide practical assistance in the broad field of domestic and foreign commerce. Field Offices act as official sales agents of the Superintendent of Documents, and maintain an extensive business reference library containing periodicals, directories, publications and reports from official as well as private sources.

Among the many services which businessmen have found of value are:

GENERAL

- Management and business aids
- Establishing a new business

BASIC ECONOMIC DATA

- Census data with national and often State and regional breakdowns, on manufacturing wholesaling, retailing, service industries, employment and unemployment, population, housing, agriculture
- Basic records of national income and product, regional trends, balance of payments, foreign aid

MARKETING AND DISTRIBUTION

- Development and maintenance of markets
- Distribution channels, facilities and services
- Marketing and distribution statistics

PRODUCTION

- Modernization of plant processes and other technological aids
- Development of new products
- Government-owned patents for free license
- Commodity standards

FOREIGN TRADE AND INVESTMENT

- Tariff and exchange regulations
- Import and export quotas, licensing regulations
- Statistics on imports and exports
- Investment and trade opportunities abroad
- Economic conditions in foreign countries

COOPERATIVE OFFICES

To make the services of the Department of Commerce more widely available, agreements have been entered into with more than 750 Chambers of Commerce, Manufacturers Associations, and similar business groups under which these organizations have become official Cooperative Offices of the Department. If specific information is not on hand in the Cooperative Office, your problem will be referred to the nearest Departmental field office.

Department Field Offices

Albuquerque, N. Mex., 87101, U. S. Courthouse. 247-0311.
Anchorage, Alaska, 99501, Room 60, U.S. Post Office and Courthouse. Phone: BR 2-9611.
Atlanta, Ga., 30303, 75 Forsyth St., N.W. JAckson 2-4121.
Birmingham, Ala., 35203, Title Bldg., 2028 Third Ave., North. Phone: 323-8011.
Boston, Mass., 02110, Room 230, 80 Federal Street. CApitol 3-2312.
Buffalo, N.Y., 14203, 504 Federal Building, 117 Ellicott St., TL 3-4216.
Charleston, S. C., 29401, Suite 201, Marcus Building, 6 Broad Street. Phone: 722-6551.
Cheyenne, Wyo., 82001, 207 Majestic Bldg., 16th & Capitol Ave. Phone: 634-2731.
Chicago, Ill., 60606, Room 1302, 226 West Jackson Blvd. 828-4400.
Cincinnati, Ohio, 45202, 809 Fifth Third Bank Bldg., 36 E. Fourth Street. 381-2200.
Cleveland, Ohio, 44101, 4th Floor, Federal Reserve Bank Bldg., East 6th St. & Superior Ave. 241-7900.
Dallas, Tex., 75201, Room 3-104, Merchandise Mart, 500 South Ervay Street. RIverside 8-5611.
Denver, Colo., 80202, 142 New Custom House, 19th & Stout Street. 534-4151.
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Greensboro, N. C., 27402, Room 407, U. S. Post Office Bldg. 273-8234.
Hartford, Conn., 06103, 18 Asylum St. Phone: 244-3530.
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Houston, Tex., 77002, 5102 Federal Bldg., 515 Rusk Ave. CA 8-0611.
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Miami, Fla., 33132, 408 Ainsley Bldg., 14 N. E. First Ave. FRanklin 7-2581.
Milwaukee, Wis., 53203, Straus Bldg., 238 W. Wisconsin Ave. Phone: BR 2-8600.
Minneapolis, Minn., 55401, Room 304, Federal Bldg., 110 South Fourth Street. Phone: 334-2133.
New Orleans, La., 70130, 1508 Masonic Temple Bldg., 333 St. Charles Avenue. Phone: 529-2411.
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Philadelphia, Pa., 19107, Jefferson Building, 1015 Chestnut Street. WAlnut 3-2400.
Phoenix, Ariz., 85025, New Federal Bldg., 230 N. First Avenue. Phone: 261-3285.
Pittsburgh, Pa., 15222, 1030 Park Bldg., 355 Fifth Avenue. 471-0800.
Portland, Oreg., 97204, 217 Old U. S. Courthouse, 520 S. W. Morrison Street. 226-3361.
Reno, Nev., 89502, 1479 Wells Avenue. Phone: FA 2-7133.
Richmond, Va., 23240, 2105 Federal Building, 400 North 8th Street. Phone: 649-3611.
St. Louis, Mo., 63103, 2511 New Federal Building, 1520 Market Street. MAin 1-8100.
Salt Lake City, Utah, 84101, 222 S. W. Temple St. DAvis 8-2911.
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Santurce, Puerto Rico, 00907, Room 628, 605 Condado Ave. Phone: 723-4640.
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